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*Description of a Persian Astrolabe, submitted to the Asiatic Society by Major Pottinger. By J. MIDDLETON, Esq. Principal of the Government College at Agra.*

The Astrolabe, whose name sufficiently expresses the purpose which it was originally intended to subserve, seems at first to have been of very simple construction, consisting of two concentric rings of brass, the one revolving within the other, upon pivots fixed in their exterior and inner edges respectively. The instrument thus formed, was so placed, that its exterior circle coincided with the plane of the meridian; the interior one was then made to revolve till the shadows of that part of the limb, towards the subject of observation, overlapped that of the opposite part, when the opening of the rings shewed the meridional distance of the luminary. By a different adjustment of this simple instrument, the zenith distance of the sun, and hence the latitude of the place, could be nearly ascertained. Subsequently, the number of rings of which the instrument was composed, was augmented until not only the meridian, but also the Equator, the Ecliptic, the Colures, &c. were represented, and thus it was when Ptolemy found it, who established the principles, and contrived the means, by which to project the whole upon a plane surface; and to this projection he gave the name Planisphere. Of the modification of the Astrolabe the Arabs availed themselves, and were enabled by their improvements in science, especially in Trigonometry, to raise it to a degree of perfection which sufficed, during several centuries, both in Asia and part of Europe, for

the somewhat unscrupulous scientific purposes of those times. To what extent the Astrolabe may be now used by observers in Central Asia, I am unable to ascertain; but among Arab navigators it has given place, generally, to the quadrant or sextant, upon which it has conferred its name; the latter being called the *Belatee* (or foreign) *Oosturlab*. Though but little that is new can be said at the present day on the subject of the Astrolabe, about which volumes have already been written, yet the one which in this article, I propose to describe, is so superior in its kind, and displays a degree of taste and accuracy of execution, which we would scarce be prepared to expect from Central Asia, about a century and a half ago;\* and it is at the same time so crowded with facts subservient to science, or superstition, that I am inclined to believe a short description of it will not be unacceptable. As to the plates, I may say generally, that for the Persian names of the planets and signs, I have substituted the Greek symbols, which modern times have adopted, and have changed for the Arabic numerals, those used by ourselves. To this substitution, I have necessarily sacrificed the elegance of the original inscription, in which the light and graceful forms of the Persian characters are tastefully intertwined with flowers. The object I had in view, constrained me to this sacrifice,—and that was, to present, in as simple and general a form as possible, an intelligible view of the instrument.

The Astrolabe in question was brought from Herat by Major Pottinger; it consists of a circular piece of brass, about eight inches in diameter, and three-fourths of an inch thick, being on one side so hollowed out, as to contain several plates of brass, upon either side of which Planispheres are described, according to the latitudes of the principal places of Mahomedan power or veneration. On its upper limb is a triangular piece of brass, not represented in the plate, through the apex of which a ring is freely passed, by which, for purposes of observation, the instrument may be suspended in the vertical. The back of the Astrolabe, with exception of the triangular part, above mentioned, is represented in Plate I. Fig. *a*. while the face is partially shewn in Plate II. I say partially, because the outer edge of the

\* NOTE.—The Astrolabe was procured by Major Pottinger from a party, who had gotten possession of it on the flight of the original owner from Herat, some time previous to the last siege of the town by the Persians.

PLATE IV

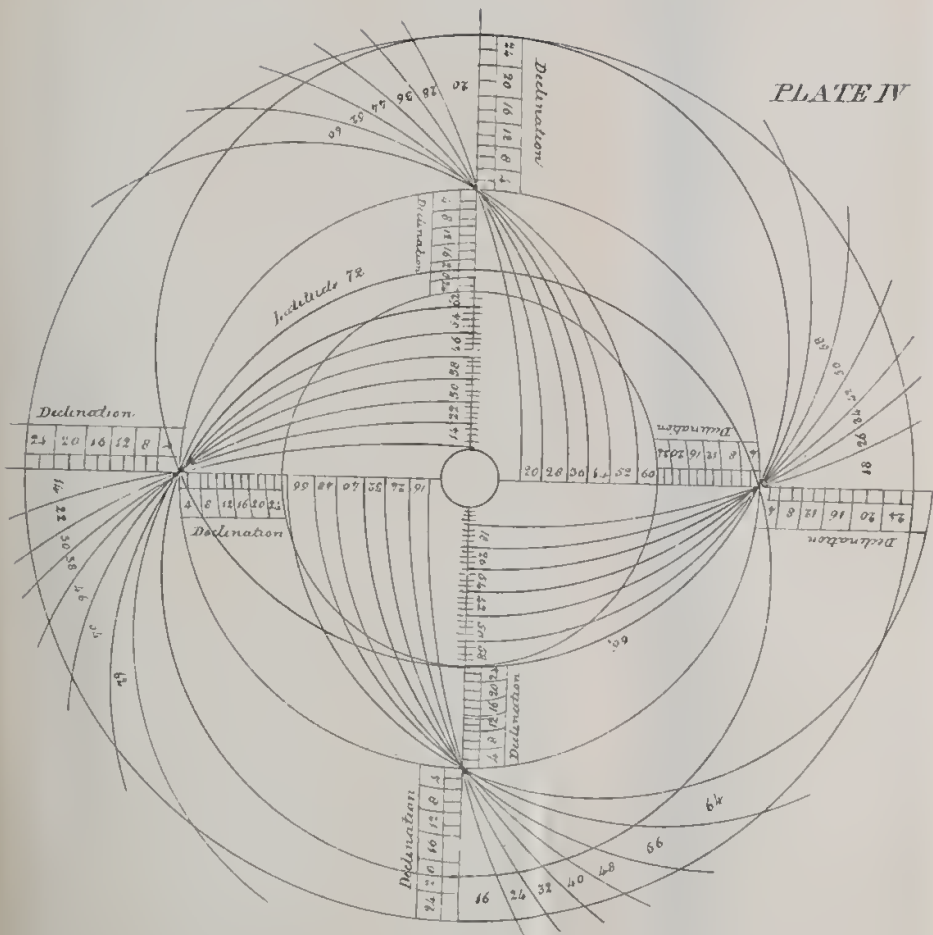
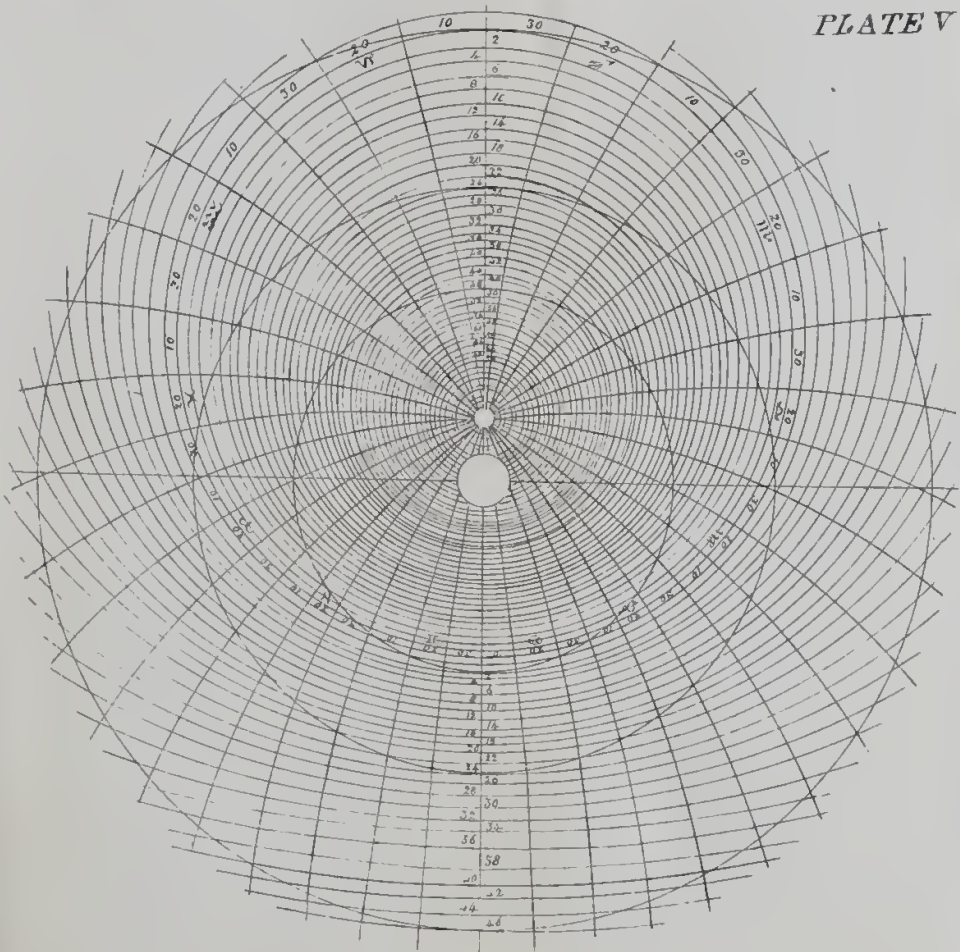






PLATE V







recess, in which the trelliced circle represented by Plate II. revolves, is divided into  $360^\circ$ , a mode of graduation well known to the ancients I have also refrained from introducing drawings of all the Planispheres; since the doing so would have swelled the number of plates to fourteen, without, at the same time, disclosing a new truth, or illustrating an old one.

Premising these general observations, I shall now proceed to more particular explanation, throughout which, agreeably to my plan, I shall abstain from introduction of the abstract forms of science. I shall also, for greater perspicuity, subdivide my description, and arrange it under heads corresponding with the purposes which the instrument is intended to serve; viz. those of Astronomy, Astrology, Geography—and first of its

*Astronomy.*—I have already said, that but little new can be adduced on the subject of the Astrolabe, and the same remark applies to Arabian science generally. The admirable works which the French *savans* have conferred upon the world on the Astronomy of the Ancients, leave but meagre gleanings for whoever may follow, especially in respect to Arabian astronomy. I shall therefore in the following remarks confine myself to a description of the astronomical uses for which the instrument in question was probably intended, and refer such who would acquaint themselves with the principles employed in its construction, to the "*Astronomie Ancienne*" of Delembre.\*

In Plate I, which represents the back of the Astrolabe, the upper limb is divided from the left and right; or, as the Arabs express it, from the east and west points, into two equal parts, terminating on the highest, or zenith point; these quadrantal arcs are again subdivided into ninety equal parts or degrees, "the use of the limb thus graduated, is for observation of the altitudes of celestial bodies, whether for ascertainment of the latitude, or of the time. The instrument, it is true, might be employed with even greater accuracy for the determination of terrestrial heights and distances, but I am not aware that the Arabs ever do employ it for such purposes; the manner in which the Astrolabe is used, is this: the label, or index, Plate I. Fig. *b.* is fixed upon its back by its axis *c*, which not only secures it there, but

\* qu: Bailly? ED.

also passing through the centres of the Planisphere discs, together with the trelliced plate (Plate II) on the face, binds the whole firmly and compactly. The observer now suspends the instrument, by holding the ring mentioned above in his right hand, the line passing through the origin of the graduated *arcs*, and the centre thus being horizontal, while that through their terminus, and at right angles to the former, is necessarily vertical. The object to be observed is now made to coincide with the plane of the quadrants, and the label is turned towards it, until a ray of light pass from it to the eye of the observer, through the perforations of two small plates projecting from the label near its ends, and at right angles to its length, (Plate I. Fig. *b*.) The arc of the quadrant between the horizontal line and the edge of the label, will evidently be the altitude required. There are undoubtedly several sources of error, which would render such an instrument unfit for the purposes of modern science, but with those for whose use it was originally intended, its imperfections would be unimportant. It is evident, that in the observation described, the altitude obtained is too great by the whole amount of refraction, an error which becomes considerable, when the object is near the horizon. I am of opinion, to, that the error in reading off the altitude would not be sufficiently allowed for, when repeated observations are impracticable, under 5.' Another ground of inaccuracy would necessarily be the difficulty, almost impossibility, with such an instrument of taking the centre in observations of the sun. These errors, springing from different sources, might sometimes, it is true, correct each other to a certain extent, but this vague probability must, of course, be insufficient to produce confidence in the instrument.

The parallel straight lines on the left of the upper limb are semi-almacanters, or semi-circles of celestial altitude, seen on their edges, while the concentric *arcs* on the right seem to be intended to connect those signs which have north declination with those which, in that respect correspond with them towards the south; such a table is committed to memory by Asiatic astronomers, to which the neat arrangement is well suited.

Under the central line, and symmetrical with the centre, are two rectangles, the one within the other, and whose length is twice their breadth. The figures alluded to, are immediately recognizable by

terms—horizontal shadow,—vertical shadow,—at their longer and shorter sides, respectively. These rectangles are each divided into two equal parts by the production of the vertical line above. They are next divided on the lower edge from the centre towards the right into twelve, and towards the left into seven equal parts. The vertical edges are also submitted to similar graduation. The meaning and principle of these graduations the next paragraph will explain.

To the Arab, as to the Hindoo astronomer, the *gnomon* was an important, if not an indispensable auxiliary. Some divide the shadow into twelve, others into seven equal parts, according to fancy, or the length of the *gnomon* employed. This scale, whether divided into twelve or seven parts, is of the same length as the *gnomon* itself, and is consequently only capable of measuring altitudes within the limits of  $0^{\circ}$  and  $45''$ , or  $45^{\circ}$  and  $90^{\circ}$ , according to the situation of the plane upon which the *gnomon* stands. In order to compensate for this insufficiency, two *gnomons* are used, one parallel to the horizon, and one vertical to it. At sun rise, it is evident, the shadow of the vertical *gnomon* is indefinite, and is for long after incapable of being used as a measure of altitude. Again, at the time of sun rise, the shadow of the horizontal *gnomon*, pointed as it is towards the east, is zero, and gradually increases as the sun ascends, until he has attained the altitude of  $45^{\circ}$ , when the shadow reaches the limit of its scale, and from that time ceases to be available as a measure of altitude. Whilst the shadow of the horizontal *gnomon* has been thus slowly stretching itself, that of the vertical has contracted to the further end of its scale, and is now prepared to perform the functions for which the other ceases to be qualified; and the same process is repeated, but in an inverse order, till the going down of the sun.

The scales by which shadow is measured, are sometimes made five times the length of the *gnomon*, the shadow being then divided into sixty and thirty-five equal parts; but as such a scale could not be laid down upon the instrument, without causing embarrassment, or injury to its compactness, the following ingenious artifice is resorted to. In construction of the Astrolabe, the horizontal scales, just described, are produced to the right and left respectively, the former being then divided into sixty, the latter into thirty-five equal parts. This done,

the edge of a geometrical rule is passed over the centre of the instrument and each of the divisions successively, and the points in which the same edge cuts the limb are marked ; the numbers corresponding to them on the original scale are then affixed, and thus the rectilinear scales have been projected into the more convenient form of circular ones, seen in the exterior demi-annulus of the lower limb. It is plain that, by means of these scales and the quadrants of altitude, the height of the sun being given, the length of the shadow may be found, and reciprocally.

Having thus described, however imperfectly, the astronomical uses of the back of the Astrolabe, I proceed next to its face, which exhibits a stereographic projection of the ecliptic on the plane of the equator. I should here mention, that Plate V. shews the method of construction here employed. If I recollect right, Delembre gives a less accurate method by which he believed Arabian astronomers effected this projection, and on this account I consider this a very accurate and neat plate, too important to omit, and by means of which, when fixed over the Planispheres by the common axis, yet left free to revolve, many interesting and useful problems, for which globes are used with us, may be readily performed. The numbers on its fancifully formed angular points correspond with those of the list of stars, with which this part of my description will conclude. On the instrument itself, the names, as given in the table, are neatly engraved ; this the flexibility of the Arabic character, and its susceptibility of packing, permitted ; with ours, on the contrary, it could scarce be done, and I have therefore preferred on that, and other grounds, the method of reference by numbers. I believe, observations regarding these stars should more properly come under the astrological head ; but as they are used for ascertaining the time of the night, &c. and as there is besides something very interesting about them, I prefer reversing them from that situation.

Ulug Beg, whose authority we have given for the position of the stars, was king of Samarcand, and flourished in the early part of the fifteenth century. He was an eminent astronomer ; and the accuracy with which his observations were made, is sufficiently proved by the fact, that on making computation from his data, for the present time, I could readily discover, with one exception, the stars inscribed on the plate. The

learned Hyde, who gives a Latin version of Ulug Beg's tables, which was obligingly lent to me by our worthy Secretary, in his able preface to that work, says of the author, "Inter distractiones animi et *repetita* regni negotia administranda ad subtiliora in scientiis investiganda se applicuit." And again quoting a contemporary historian and panegyrist, he says, "At celsus iste animus etsi in summo rerum fastigio esset constitutus tamen in pulverem mathematicum descendere non dedignatus esset." This historian, obviously, did not understand that the royal astronomer while thus engaged, was but drawing pleasure from its purest source, and inscribing his name on the bright heavens, in a character which would not soon be forgotten. We are informed by Ulug Beg himself, that for the observations, the result of which appear in his tables, he caused to be constructed a quadrant of great radius, "cujus radius altitudine Templi Sanctæ Sophiæ æquaret," and that the latitudes and longitudes of the stars thus obtained, were to serve as data for future computations, the method of effecting which, he himself supplies.

"Stellarum loca in tabulis designavimus pro initio anno Hejyra 841, at quovis tempore quis possit stellarum loca invenire cum singulis septuagenis annis solaribus per *annum* tantum gradum moveantur." The addition of  $1^\circ$  for every 70 years is not quite correct, as the precession of the equinoxes is about  $1^\circ$  in 72 years nearly, on the average, since the time of Ulug Beg; at present it is  $1^\circ$  in 71.66 years. Allowance is also to be made for the diminution of the obliquity, a fact which appears to have been unknown to ancient astronomers.



No.	Names.	Names with us.	Longitude accord- ing to Ulug Beg.	Latitude accord- ing to Ulug Beg.	Magnitude accord- ing to Ulug Beg.
1	ظهر الذئب Zahir uddub,	.. Dubhe, ..	4 <sup>s</sup> 7° 25'	49° 24'	2
2	قائد Qayed, ..	.. Alioth, ..	5 19 10	54 9	2
3	سماک راصح Semake Rameh, ..	.. Arcturus, ..	6 16 31	31 18	1
4	نیرنگ Nair e phukah, ..	.. Alphekka, ..	7 4 34	44 30	2
5	نسرواق Nusree waqy, ..	.. Lyra ..	9 8 19	62 0	1
6	منقار الدجاجه Menqaru uddujjah, ..	.. Albire ..	9 24 25	49 12	3
7	ذئب الدجاجه Zunub uddeyjah, ..	.. Arided, ..	10 28 46	59 42	2
8	قطب برج Qotub e Burooj, ..	.. Pole of the ecliptic,	.. ..	90 ..	...
9	کف الخضب Kuf ul Khuzai, ..	.. $\beta$ Cassiopee, ..	0 28 1	50 48	3
10	مرفق الثريا Merphug ussoreya, ..	.. $\alpha$ Persei, ..	1 25 7	29 21	2
11	راس غول Ra se ghowl, ..	.. Algol, ..	1 18 55	22 0	2
12	جنب المسلسله Junub ul musulsulut, ..	.. Mirach, ..	0 23 13	25 36	2
13	عيق Aiyooq, ..	.. Capella, ..	2 14 43	22 42	1
14	راس الحيه Rasul hyyah, ..	.. $\alpha$ Ophiuci, ..	8 15 13	35 51	3
15	عنق الحيه Onuq ul hyyah, ..	.. $\alpha$ Serpentis, ..	7 14 25	25 48	3



No.	Names.	Names with us.	Longitude according to Ulug Beg.	Latitude according to Ulug Beg.	Magnitude according to Ulug Beg.
16	نسر طایر Nusre tayer,	Atair, ...	9° 24' 10"	29° 15'	2
17	ذنب العقاب Zunub ul oqab,	ζ Aquilæ,	9 12 31	36 15	3
18	منكب الفرس Munkeb ul phurs,	Sheat Alperas,	11 21 37	30 51	2
19	فم الفرس Phummul ul phurs,	Enir, ..	10 24 28	22 0	3
20	عيون الثور Aiwun ulsoor,	Aldebaran,	2 2 31	5 15	1
21	قلب الاسد Qulb ul asud,	Regulus, ..	4 22 13	0 9	1
22	ساق الاسد Saq ul asud,	*	.. .. .	.. .. .	..
23	صخرة Surphuh, ..	Deneb, ..	5 13 49	12 0	1
24	سماك اعزل Semak eazul,	Spica Virginis,	6 16 10	2 9	1
25	كفة شمالي Kuyh e Shumali,	β Librae, ..	7 11 58	8 45	3
26	كفة جنوبي Kuph e junoobi,	Zubene Sehamali,	7 7 52	0 45	3
27	قلب العقرب Qubbul uqrub,	Antares, ..	8 2 16	4 30	2
28	ذنب الجدي Zunub ul judee,	γ Capricornus,	10 15 28	2 15	3
29	فم القيطس Phumm ul quytus,	γ Ceti, ..	1 2 10	12 18	3

\* Regarding this star, I am uncertain; I do not meet with it in Ulug Beg's tables, and of other authorities whom I have consulted, some do not mention it, others think that Arcturus is meant.

No.	Names.	Names with us.	Longitude accord- ing to Ulug Beg.	Latitude accord- ing to Ulug Beg.	Magnitude accord- ing to Ulug Beg.
30	صدء القيطس Sudur ol quytus, .. ε Ceti,	.. ε Ceti,	0° 22' 37"	25° 42'	4
31	ذئب قيطس جنوبي Zunub e qutus e ju- noobi,	β Ceti,	11 25 25	21 0	3
32	داليمني Yud ul yumno, ..	.. Betelgeux,	2 21 13	16 45	1
33	رجل اليسري Rejel ul yusra, ..	.. Kijel, ..	2 9 25	31 18	1
34	رجل اليمني Rejel ul yumna, .. ψ Orionis,	.. ψ Orionis,	2 18 40	33 21	3
35	يد اليسري Yud ul yusra, ..	.. Bellatrix,	2 13 34	17 15	2
36	مسافت النهر Musaphut ul nuhur, .. γ Eridani,	.. γ Eridani,	1 16 40	33 15	3
37	ساق ايمر ساكب Saqayyumne sakub, Fomalhaut,	.. Fomalhaut,	10 26 19	21 24	1
38	شعراي يمني Sherai yemani, ..	.. Sirius,	3 6 19	39 30	1
39	شراي شمالي Sherai shumali, ..	.. Procyon,	3 18 22	16 0	1
40	طرف اسفينه Turpho saphynah, .. ζ Navis,	.. ζ Navis,	4 3 10	43 33	3
41	فرد اشجاع Phurd o shijay, ..	.. Alphard,	4 19 31	22 30	2
42	قاعدة الباطيه Qaed utool batyah, ..	.. Alkes,	5 12 37	22 0	3
43	جناح الغراب Junah ul ghorab, .. γ Corvi,	.. γ Corvi,	6 2 46	41 18	3

*Astrology.*—This is a subject which, I am aware, has but little interests for us; yet I should have but unsatisfactorily completed the work I have undertaken, had I passed it over. Among the Mahomedans of India, too, so far as my information enables me to judge, Astrology is but little respected; some of the most intelligent of them, whom I have met with, and questioned on the subject, evidently disliked the inquiry; and generally replied to the effect, that there is no power in the creation but that of the Deity, and that it is against the religion of a true Mussulman to believe in other influences. It is however probable, that extreme ignorance on subjects connected with science may have as much to do with their disbelief, as rigid piety. What degree of importance may be at present attached to it in Central Asia, I am not aware; if, however I may judge from the care and finish which have been bestowed on this part of the Astrolabe, and its completeness, it is considerable; and I remember Major Pottinger stating, that the instrument was chiefly used for Astrological purposes, by the person from whom he obtained it. Towards the South West, it appears to have still its hold, since Lamartine informs us, in his Travels in Palestine, that on his visit to the eccentric Lady Esther Stanhope, he thought he could detect the secret of her surprising influence over the lawless tribes of the desert, in her enthusiastic belief, and apparent skill, in the sciences of Astrology and Palmistry.

Among the Hindoos it is still implicitly believed in, and the necessity which this imposes on those who profess it, of being acquainted with the prominent facts of Astronomical science, has served to continue down to our times *disjectæ membræ* of their ancient system, which otherwise, like the rest, would probably have been lost. I shall now proceed to explain, what part the Astrological constants engraved upon the Astrolabe, (Plate I. Fig. *a.*) bear in the casting of a Horoscope, be it natal or annual.

The interior of the rectangle, about the sides of which, as already explained, are distributed the divisions of shadow, as also the four interior demi-annuli of the lower limb are entirely devoted to Astrological purposes.

The rectangle contains the celestial Trigons, so called from their positions in the ecliptic occupying the vertices of equilateral triangles, together with the Planets which govern them by day, and those

which govern them by night. Their influences are expressed in general terms in the margin. Their order in the drawing is, according to that of Persian writing, from left to right, and hence perhaps the following arrangement will be found more plain:—

<i>Trigons.</i>			<i>Governing Planets by Day.</i>			<i>Governing Planets by Night.</i>		
γ	♋	♌	☉	♌	♍	♌	☉	♍
♌	♍	♎	♋	♍	♎	♍	♋	♎
♍	♎	♏	♌	♎	♏	♌	♌	♏
♎	♏	♐	♍	♏	♐	♍	♍	♐
♏	♐	♑	♎	♐	♑	♎	♎	♑
♐	♑	♒	♏	♑	♒	♏	♏	♒
♑	♒	♓	♐	♒	♓	♐	♐	♓
♒	♓		♑	♓		♑	♑	
♓			♒			♒	♒	

By the Hindoo distribution, the twelve signs constitute one Trigon, each of the vertical column constituting a side.

The inner demi-annulus contains the lunar mansions; they are 28 in number, and extend over the whole ecliptic; each representing, proximately, the space passed over by the moon in one day. Their names are as follow:—

No. of Mansions.	Names of the Mansions.	No. of Stars.	No. of Mansions.	Names of the Mansions.	Names of the Mansions.	No. of Stars.
1	شرطین	2	15	غفر	Ghuffr,	4
2	بطین	3	16	زبانا	Zoobana,	2
3	سریا	7	17	اکلیل	Ikleel,	3
4	دیوان	5	18	قلوب	Qulub,	1
5	هقعه	3	19	شوله	Showyl,	2
6	هانای	5	20	زغایم	Naim,	3
7	ذراع	5	21	بلده	Birdub,	6
8	نقره	2	22	ذابح	Zaby,	2
9	طرفه	1	23	بلع	Baly,	2
10	چبیه	1	24	سعد	Sád,	1
11	زیره	2	25	اخبیه	Ukbbieh,	Several
12	صوفه	1	26	مقدم	Mukadam,	Several
13	عوا	4	27	موغر	Moghur,	1
14	سماک	2	28	رشا	Risha,	Several

These mansions occupy a prominent place in the Astrological system; certain actions are to be annually performed, certain to be avoided by a person throughout life, according to the mansion in which the moon was at the time of his birth. With the Hindoos, each mansion is divided into four equal parts, to each of which appertains exclusively a certain letter or syllable, according to which the name of a person born during the occupancy of such portion, has its commencement determined. For instance, the late Lion of the Punjab must have been born while the moon was in the 1st quarter of the 15th mansion, as to that alone belongs the letter **र** with which his name **रणजीत सिंह** commences. There are many other attributes which they possess, but which it would be tedious and unprofitable to mention. The names of Mahomedans are determined by the Koran, as the *sortes* of old were by a reference to Virgil.

The next demi-annulus contains the faces or aspects of the planets, the nature and importance of which are as follow:—Each planet views with full power the sign opposite to that in which he is, if in the 4th and 10th signs with one half, or so on.

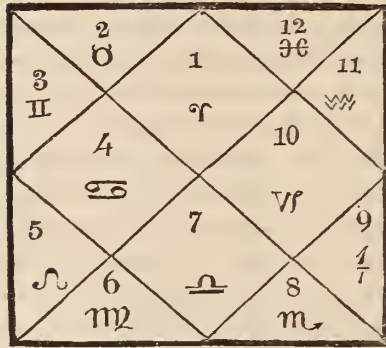
The full power of a planet is represented in the plate by the number 60, the half by 30, &c. &c.

The third demi-annulus contains the signs of the Zodiac themselves, to which, as will be seen, the others are referred.

The fourth, and last, is occupied by the *hudood*, or houses of the Planets, which I have termed, not happily I find, “comparative influences;” each sign is divided amongst the Planets. For instance, to Jupiter appertains the first six degrees of Aries, and consequently if he is within the limits of the first six degrees, he is in his own house; if between the sixth and twelfth degrees, in the house of Venus, and so on.

When a Horoscope is to be cast, a square is first described, and divided into twelve compartments as follows:—





The arrangement of the signs in this is intended to shew their position in the case when ♎ rises at the time, for which celestial interpretation is to be made.

In order to the casting of an Annual Horoscope, the following data have to be established.

*First.*—The master at the time of birth of the changing sign, *e. g.* if Aries rises at that time, the next year at the same hour it will be Taurus, and so on.

*Secondly.*—The master of the first house for the year.

*Thirdly.*—The master of Trigrams.

*Fourthly.*—The master of the sun's house at the beginning of the year, if the year begin during the day, and of that of the moon, if the year begin during the night.

*Fifthly.*—The master of the first house at the time of birth, if Aries or Scorpio rose at that time; Mars is the ruling planet if Taurus or Libra; Venus, if Gemini or Virgo; Mercury, if Cancer; the Moon, if Leo; the Sun, if Sagittarius or Pisces; Jupiter and Capricornus or Aquarius, if Saturn.

The above observations and computations having been duly made, the advantages and disadvantages, to which every planet is subject, are represented by numbers. The former are then added, and the sum of the latter subtracted from the amount of each. The remainders are now compared, and the planet which has the greatest remainder is the master of the year, and his influence is then paramount.

A similar, but far more complex process, is followed in determining a natal Horoscope; but which, as my object is merely to render



intelligible the inscriptions on the Astrolabe, it were superfluous here to enter into.

I shall now take leave of this part of my subject, with the hope, that a structure so laboured and unsubstantial, so carefully repaired and sustained by selfishness and priestcraft, will at no distant date crumble into dust, when the congenial shade of ignorance, which it now enjoys, shall have been dissipated by the sunshine of knowledge.

*Geography.*—I shall now describe the geographical and devotional parts of the instrument. The association of these two subjects in one category may at first sight appear singular, but it is none other than what the Astrolabe itself exhibits. I have not deemed it necessary to present a drawing of that part of the instrument exclusively devoted to these subjects, since I feel reluctant to increase the number of the plates beyond what is indispensably requisite; and in the present case, I have hopes of making myself understood by explanation alone.

The bottom of the recess in which the Planispheres repose, is divided by concentric circles, the common centre of which is the reason of the recess into the annuli. The outer of these contains symbols indicating the directions, generally expressed, of Mecca, from the places named in the annulus next below, and correspond with S. E. for South-East, &c. The second contains several of the principal places of Mahomedan veneration and power, beginning, of course, with Mecca. The third and fourth are devoted to the longitudes and latitudes of those places respectively, and the fifth is occupied with the azimuths of the Kaaba at each of them. The remaining annuli are similarly occupied; and thus by this neat arrangement, fifty of the principal Mahomedan cities in Asia, with their absolute and relative positions, are exhibited at one view. It must be confessed, however, that these latitudes and longitudes are, with a few exceptions, under the most favorable view of them, exceedingly inaccurate, and consequently, so are also the azimuths dependent upon them.\* Such places as

\* The following is their method of deducing the azimuth from the latitude. Having cut off from the meridian, beginning at the zenith, an arc equal to the sum or difference of the latitudes, and from the prime vertical an arc equal to the sum or difference of the longitudes, and from the points of section having drawn perpendiculars to the arcs; the point in which these perpendiculars meet is the zenith of Mecca. Then having drawn chords to the arcs denoting the distances of the zeniths, and those expressing the differences of latitude and longitude, they easily obtained, by Plane Trigonometry, the azimuth angle.

Mecca, Medina, and Ispahan, and a few others, have their latitudes and longitudes pretty correctly assigned; those of inferior note seem to have had them very carelessly observed, or perhaps merely guessed. I must at the same time confess my belief that, generally speaking, European mathematicians have not done their Arabian predecessors full justice, in respect at least to their longitudes; but that having assigned to them a first meridian from which they did not compute, they have unintentionally attributed to them errors that sprung from themselves.

The first meridian among the Greeks passed through the "Fortunate Islands," a meridian which Ptolemy adopted, and from which he made his calculations. These islands have been pretty generally believed to be the Canary Isles, probably from the circumstance of their lying at the Western extremity of Europe. I am rather inclined to think, however, that the place from which Grecian geometers, (and consequently their imitators, the Arabs,) commenced their longitude, was an *imaginary* one, and that therefore, like the *Lanca* of the Hindoos, its position was never satisfactorily ascertained.

The Fortunate Isles probably owed their origin primarily to the fabled *Hesperides*, and, secondarily, to that copious fertility of invention that sprung into existence about the time of Alexander, and which may be traced downwards to that of Columbus himself: an invention which filled up the blanks of unexplored regions with mysterious and delightful lands, untrodden by the foot of ambition, where the golden age still lingered in its bright perfection. Diodorus informs us, that the Tyrant Cassander sent one Gohemerus on an exploratory voyage, and that he discovered the island of Panchaia, astonishing for its wealth, and the innocence of its inhabitants: where the most perfect happiness, peace, justice, and voluntary obedience to the laws, had flourished for thousands of years; this was indeed a fortunate island, and probably the father of our family. Pliny the second informs us, that it was in his day believed by some, that the *Hesperides* still existed somewhere in that direction, but that there was much doubt upon the subject. He also states indeed, giving his authority, that the Fortunate Islands lie under the first meridian. "Juba de Fortunatis ita inquisivit; sub meridiem positas esse prope occasum a Purpurariis DCCXXV.M. passuum sic ut CCL supra occasum navigetur: deinde

per CCLXXV.M. passuum ortus petatur." Without doubt, these were the Canary Islands, but there is no reason to believe that, by any observations of his, the navigator ascertained them to lie under the first meridian; it is rather to be suspected, indeed, that from their being a group, and lying in the supposed direction, he assumed them to be such. Pomponius Mela also attempts to identify the Fortunate Isles with the Canaries, but his description, more minute indeed than that of Pliny, is so tainted with incredibilities, as to convince us of the little reliance that is to be placed on the observations of those who supplied him with information. Some Arabian authors of the twelfth century have got over the difficulty of identification, by asserting, that the "Fortunate Islands" had been, before their time, submerged. However this may be, it may I think be easily shewn, that the first meridian of the ancients could not have passed over any part of the Canary Islands.

In order to ascertain the first meridian, as implied in their computations, I selected some of the principal places, and thus found it to be about  $35^{\circ} 50'$  to the west of ours, and thus about nearly  $6^{\circ}$  beyond the most remote of the Canary Isles.\* Bagdad for instance, according to Ulug Beg, in whose authority I have much confidence, lies in  $80^{\circ}$  E. longitude, while its ascertained longitude is with us  $44^{\circ} 30''$ , which gives for the first meridian of the Arabs, a position  $35^{\circ} 30''$  west of ours, or about  $5^{\circ}$  to the west of the Canary Islands, and by the whole amount of this difference have the errors of Arabian longitudes been augmented where errors existed, and supposed where they were not. Playfair, for instance, in the introduction to his Geography, while commenting upon their inaccuracies, expresses surprise that they should so far have miscalculated the longitude of the *debouchment* of the Indus, which if he had taken their first meridian in place of the assumed one of the Canary Isles, he would have found it pretty exact.

To our Astrolabe belongs, as already stated, several circular plates of brass, upon which are inscribed stereographic projections of the

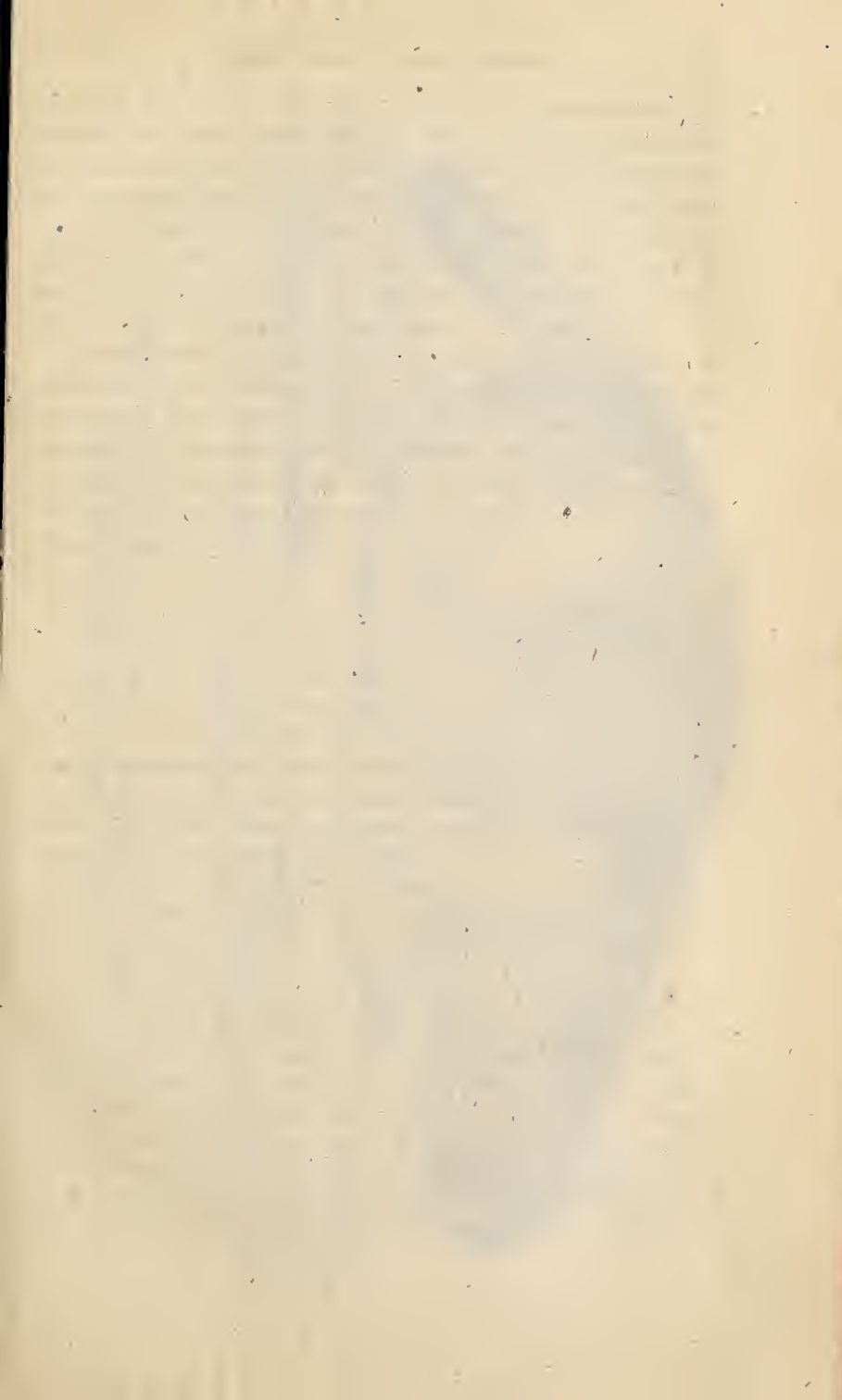
\* The following computations confirm this statement:—

	a. Long.	E. Long.	Diff. of Long.	Average diff.
Medina, ....	$75^{\circ} 20''$	$39^{\circ} 20''$	$36^{\circ}$	
Damascus, ....	$72^{\circ}$	$36^{\circ}$	$36^{\circ}$	$35^{\circ} 53''$
Ispahan, ....	$86^{\circ} 40''$	$52^{\circ}$	$34^{\circ} 40''$	
Sheraz, ....	$88^{\circ}$	$52^{\circ} 45''$	$35^{\circ} 15''$	
Bussorah, ....	$84^{\circ}$	$46^{\circ} 30''$	$37^{\circ} 30''$	

sphere, according to the latitudes of certain places. Plate III. is a representation of one of these, and only differs from the others in Polar altitude, or otherwise in the distance of the Pole from the assigned limit of vision, which in such projections, is supposed to lie considerably below the horizon : here  $24^{\circ}$ .

It will be seen from an inscription, at the centre of the plate, that it is characterised not by its latitude alone, but also by a certain measure of time. This was usual among ancient Geometers, who divided, arbitrarily, the earth into a certain number of climates by parallels to the Equator. The limits of these climates were determined, either by their equinoctial distance, or by the length of their longest day, or, as in the case of our Astrolabe, by both. The column of figures rising upwards from the margin of the plate towards the Pole, belongs to the parallels the latitude, of complements of which are numbered, obliquely, from the Equator northward, on both the east and west sides. The figures indicating the degrees of longitude, are arranged both ways from the meridian to the horizon, and are then continued under the Pole on a semi-parallel of latitude. In addition to the meridians and parallels of latitude, are two concentric circles parallel to the horizon, one above, and the other below it : these are almacanthers of altitude. There are also horary circles, with their corresponding numbers, commencing with "first" at the east point, and continuing round the sphere to the same point, also numbers commencing from at the west and ending with 12 at the east, the reading being backwards. These were called by the Arabs direct or reverse hours, for an obvious reason. The latter arrangement of the numbers arises, as I apprehend, from their being conceived to lie on the side of the sphere opposite to that of the former.

By means of the Planisphere, the moveable plate, (Plate II.) already described, and the circles of shadow and of altitude, numerous problems regarding latitude and longitude, time, the altitudes of celestial bodies, &c. are readily performed. Indeed, they serve pretty generally, in these respects, the purposes of our globes, with the great drawback, however, that each Planisphere serves only for its own latitude. Hence it is, that each Astrolabe has usually, in addition to their finished spheres, a model plate; after which others may be constructed. The representation of this is given in Plate IV. It consists of horizontal arcs des-







*Arctomys Menulaganus*. Marmot of Nepal and Tibet.  
& nat. size. called *Shipe* and *Chipe*



cribed for the different latitudes marked at their ends, as also the Equator, the Tropics, the Solstitial and Equinoctial colures and indications, in round numbers of the obliquity of the Ecliptic. On some of the Planispheres are drawn, the circles of *sirut* or circles of the direction of the Kaaba; on the one given it is wanting; a few of these appear on the right of the upper limb, Plate I. Fig. *a*. one of which is marked as the line of prayer for Ispahan. The others are similarly marked in the Astrolabe, but I have omitted the names.

In now taking leave of my subject, I have much pleasure in acknowledging my obligation to Rajchunder Dutt, an intelligent Pundit of Calcutta, now, I believe, employed at the Nepaul Residency, for the valuable assistance which he rendered me in decyphering the inscription; as also to Pundit Ruttunlal of this place, who has supplied me with much astrological information.

Agra, September 11th, 1841.

*Notice of the Marmot of the Himalaya and of Tibet. By B. H. Hodgson, Esq.  
Resident at the Court of Nepal.*

In the extensive peltry trade carried on between Nepal and Tibet, no skin is more commonly met with than that of the Marmot, which I long ago named in my Catalogue, *Arctomys Himalayanus*, and now beg to furnish a summary description, and correct drawing of.

This animal is from twenty-three to twenty-four inches long from snout to vent, and the tail is usually from five to six more. It is a massive animal, larger than the Indian Hare, with weighty broad head, furnished with large eyes, and small, rounded, but apart, ears.

The neck is short, the body full, the limbs short, and of equal strength fore and aft, though the anterior nails be somewhat stouter than the posterior. The general structure of the feet, is that of the commoner *Murines*, or Rats, and the digits are cleft to their bases, as in the ordinary Rat and Mouse; but the nails are rather stouter, and more suited to digging, though not at all typically scansorial. The tail, one-fourth the length of the animal, is rather slender and cylindric, ending in a bluff point, and not having the hair at all more elongated, or more or less full than it is on the body. The incisors are very powerful, and the molars are as broad on the

crown, as they are high above the gum. Dental formula, incisors  $\frac{2}{2}$  molars  $\frac{55}{44}$ . The distance between the snout and the fore canthus of the eye is greater than that to the base of the ear from the latter; and so broad is the head, that the eyes are  $1\frac{5}{8}$ th inch apart in straight measurement. The general colour is a clearly fulvescent catsgrey, much like that of *Felis Chaus*, and fading into pure rufescent yellow below; the limbs and ears the same, but deeper; and the chaffron and end of the tail, dark brown. The fur is close, thick, composed like a cat's, but rather harsher, and of two sorts, or hairy and woolly: the hair, straight, elastic, about  $1\frac{1}{2}$  inch of maximum length, and triannulate as to colour from the base, with dusky-brown, rufescent-yellow, and black; the last and apical part being the least; the woolly piles about one inch long, wavy, and void of the black tips; hands, feet, and face, dressed closely in soft hairs only. The following, then, may serve for a specific character, perhaps.

*Arctomys Himalayanus*, of a rufescent cat-grey colour above, and pure rufous yellow below; the limbs more saturate; the bridge of nose and end of tail, deep brown; the tail equal to  $\frac{1}{4}$  of the length of the animal, cylindric and bluff pointed; the fur close, thick, composed of two sorts, and trebly ringed in all the upper parts with dusky, rufescent yellow and black; the wool, without the last ring of the hair; snout to vent 24 inches; tail 6 with hair; head  $4\frac{3}{4}$ ; palm (with the nail)  $2\frac{1}{2}$ ; planta (ditto)  $3\frac{1}{2}$ .

The habitat of this species is the Himalaya, and Kachar rarely, and very commonly the sandy plains of Tibet; gregarious in large bodies; live in burrows; hibernate for four months; have all the confident tameness of the Bay Bamboo Rat of Nepal, which they greatly resemble in manners; so that the people say of both, that when approached by men, they never think of running away; but put up their fore-feet civilly, deprecating the intrusion, and, if not heeded, resign themselves at once to captivity. The fat of the Marmots is much prized for certain medicinal properties, and is used as an unguent in rheumatism and gout. The cured skins are yet more valued for dress, and form an important article of commerce. Many come to Cathmandoo, and many more go to the towns of China, in the course of trade.

Nepal, June, 1841.

B. H. HODGSON.

*Memorandum on the Organization of a Museum of Economic Geology for the North-Western Provinces of British India, to be established at Agra. By Lieut. W. BAIRD SMITH, Bengal Engineers.*

The adequate representation and illustration of those important and extensive departments in the economy of life, in which the principles of the science of Geology are made subservient to the interests or comforts of mankind, may with safety be assumed as the chief characteristics of a well-organised Museum of Economic Geology. To insure such results, the resources not of science alone, but of art also are essential; since while the one indicates *when* general principles are applicable to special cases, the other shews *how* they are to be most effectively applied. In devising, therefore, a scheme for the organisation of a new institution of this nature, theory and practice must each have its proper place assigned to it, and each be illustrated by appropriate means. It has been my anxious endeavour to embody these views practically in the following details of the system proposed for the Museum of Economic Geology for the North-Western Provinces of India, and although it may be long ere the institution attains that completeness in its various departments herein specified, it has been considered advisable in projecting it, to do so on the most effective scale. Slow and laborious may be its progress, yet may it be anticipated that by the continual efforts of those interested in its success, even the highest point in the scale proposed, will ultimately be attained.

2. In the investigation of the mineral resources of hitherto unexplored districts, it is of the utmost importance to have a well-defined standard to which the newly discovered products of such regions may with readiness be referred. The basis, therefore, of the Museum in the department of mineralogy, ought, I conceive, to consist of a series of characteristic specimens of all minerals of established economic importance; and if it were possible to procure such specimens from the localities most celebrated for producing them, their value would in some degree be increased. The object of this collection being to impart as great an amount of information as possible, all its arrangements ought to be made subservient to this purpose. The specimens should be carefully

Characteristics of a well-organised Museum of Economic Geology.

Arrangements of the department of Mineralogy.

classified and named, according to an established system of classification and nomenclature, while means ought to be taken to exhibit for each those synonymes by which it is so unhappily burdened. I feel it a matter of considerable difficulty, from the existing state of Mineralogy, both as regards classification and nomenclature, to specify which of the many systems that have, from time to time, been proposed, is likely to prove the most useful. In truth, the many anomalies that disfigure even the most highly recommended of our methods of arrangement, and the excessive and bewildering multiplication of synonymes in mineralogical nomenclature, leave us but the power of selecting the least defective of the schemes that have been proposed; so, that in expressing myself in the present instance in favour of the Natural History system of Professor Mohs, I would add, that I am fully conscious of its deficiencies, and of the anomalous results it not unfrequently exhibits; but on consideration of its general utility, of its extensive adoption as the system of valuable mineralogical works, and of schools of instruction, I am disposed to prefer it to the rival chemical system of the celebrated Berzelius, the only one that can compete with it. Believing, however, that minerals will never be grouped according to the system that actually exists in nature, save by a method of classification that, without being rigidly based either upon their external physical properties alone, as in that of Mohs, or on some arbitrary relation of their chemical constituents, as in that of Berzelius, takes due cognizance of both classes of characteristics, and forms its orders, genera, and species, in accordance with the natural analogies of these, I regret much that I have never seen the system recently proposed by Professor Naumann, of Freyberg, which is based on the preceding mixed principle, and which, in the opinion of Mr. Whewell, himself a Professor of Mineralogy, is the best hitherto published.\* Till this system becomes known in India, I would recommend adherence to that of Mohs, in the classification and nomenclature of the mineralogical department of the Museum.

3. While it is essential to the completeness of the Museum that all  
 Metallic minerals    minerals of established economic ratio should have  
     Coals.                    place in it, their high commercial and social im-

\* *History of Inductive Sciences*, vol. iii. p. —



portance give a marked pre-eminence to those of the metallic and carbonaceous orders. Both of these ought, accordingly, to be illustrated to the greatest extent of detail that circumstances will admit of, and specimens of metals, with their various ores, as also of the different species of coal, are of primary importance. The opportunity thus afforded of studying with care those external characters which, by experience, have been recognised as the indices of certain properties in the minerals exhibiting them, may frequently enable us to pronounce an immediate opinion as to the economic importance of newly discovered members of either of the two orders above alluded to. Specimens of each metal when it occurs native, accompanied by others of its native salts and ores, are, I therefore conceive, essential to the illustration of metallic mineralogy, while specimens of all the varieties of coal, both of such as are considered good and bad, are equally essential to that of carbonaceous minerals. As subordinate to the former, specimens of the different matrices, whether of rock, gravel, sand, or clay, in which metallic minerals occur may be provided, while in the same relation to the latter, specimens of the rock, that constitute the coal formation, together with their characteristic fossils, would prove most useful. Some farther remarks relative to the illustration of these two important orders will be made in noticing the mechanical details in Metallurgy and Coal Mining; and I would only add as a reason for adverting specially to them at present, that there is abundant reason to believe, the North-Western Provinces of India afford, both in metal and coal deposits, fields of the richest character. Metallic minerals have long been known, and wrought for commercial purposes throughout them, and indications of extensive coal beds have very recently been discovered in the Himalayas, so situated, as in the estimation of their discoverer, to be of the highest importance to our lately acquired right of navigating the Indus. This, indeed, is but one of many causes that at present combine to give importance to such researches, and to urge upon us, increased activity in their prosecution. The most powerful of all these stimulating causes will probably be found in the execution, in all likelihood at no distant period, of a grand line of internal navigation, connecting the remotest limits of these provinces, with the central mart of Indian commerce, and promising, from the scale on which it has been projected, to admit of such increased

facilities of intercourse, as may be expected to awaken to new life the commercial energies and enterprise of the valuable districts, through which it will pass.

4. Since it may be expected that many of those persons willing to avail themselves of the existence of the Museum to become acquainted with the principles of Economic Geology would require information of the most elementary character, I consider it would add to the useful effect of the Museum, were measures adopted to facilitate the acquisition of such knowledge. As addressing themselves more immediately to our senses, the external characters of minerals first claim attention, and among these, the high importance of crystalline form, arising from its constancy in the same substances, naturally suggests that some measures should be taken for the illustration both of the general principles of Crystallography, and of the manual operations by which these are practically applied to the determination of particular bodies. For the former object, it would I think be found most useful to have a series of model crystalline forms, so arranged, as to exhibit distinctly, those varied, yet determinate modifications of certain primary forms, which are found to exist among crystallised bodies in nature; for the latter purpose, goniometers, or instruments for the measurement of angles of crystals, both of the common compass and reflective kinds, ought to be provided. Those brilliant optical phenomena exhibited by minerals, possessing the property of double refraction, under the influence of polarized light, and which furnish us with new means of referring these minerals to the systems of crystallisation of which they may be members, require for their display an apparatus of the most simple character, consisting only of a few pieces of common glass, and any non-metallic reflecting surface. For the determination of the important property of specific gravity, a hydrostatic balance, or properly constructed hydrometer would be essential, while, a small magnet and electrometer would be necessary for ascertaining the magnetic or electric properties of any mineral under examination. Separation of the most important characters is elicited by the employment of the blow-pipe in the examination of minerals. This therefore, with its necessary accompaniments of fluxes, &c. would be required, and with the addition of a few minor articles, as files, knives, pincers, &c. would

Requisites for the determination of the external characters of Minerals.



complete the list of requisites, for the determination of the external properties of mineral substances.

5. But these physical properties will not in all cases suffice for the iden-

Reason for the attachment of a chemical laboratory to the Museum of Economic Geology, North Western Provinces, and anticipated benefits.

tification, still less for the determination of the economic value of newly discovered minerals; and were we to take cognizance of them alone, we would be led, as Mohs has in many instances been, to class together substances of the most different nature, on account

of their external resemblances. Farther, it has been found, that there exists in nature a class of bodies between which the singular quality subsists, of being competent to replace each other in compound minerals without in the slightest degree affecting the external characters of these. Since the class of isomorphous substances is by no means limited in number, the necessity of having recourse to the definitive test of chemical analysis before deciding on the real nature of any mineral presented to us, becomes apparent. The attachment therefore of a small, but effective chemical laboratory, to a Museum of Economic Geology is, I consider, essential to the efficiency of the institution. Such a laboratory ought to be fitted up with special reference to mineral analysis, and as the apparatus and re-agents required for this are not either very extensive or expensive, the necessary outlay would, I believe, be amply compensated by the results of its operation. It is not merely in the department of mineralogy that its aid would be required; but it will be found, as we advance, that in almost every department of Economic Geology the results of analysis will prove most important,—important not only in an economical, but also in a purely scientific point of view. It is to be remembered that mineralogy is no more limited to the mere identification and classification of minerals than is Astronomy to those of the heavenly bodies, or Botany to those of plants. Like any science it has to do with causes as well as an effect; with laws as well as results, and its true limits will only be attained, when to a clear development of physical properties, it adds the discovery of those principles of internal organisation of which these properties are only the visible exponents. An element of the first importance towards such discoveries, is a thorough acquaintance with the chemical components of mineral substances, so that viewed only as a boon to pure science, the application of analysis

to the mineral products of the North-Western Provinces would be of the highest order ; and the field is so novel and extensive, that we could scarcely fail to develop information at once valuable and interesting.

6. From the experience already obtained in the prosecution of mining operations in this country, it appears that one main obstacle to their success has arisen from defective knowledge of the practical and working details of such operations. In the arrangements of the practical department of the Museum, our efforts ought accordingly to be directed to the removal of this deficiency, and measures ought to be adopted for procuring, from the best sources, the means of illustration required. Primarily, in the case of metallic minerals, specimens of the ores of each metal, in the different stages of their progress, from their original extraction from the matrix to their production in a state fit for commercial or general purposes, ought to be procured, and arranged systematically with every reference to instruction. For the illustration of each process, wherein apparatus or machinery is employed, models of these ought, whenever practicable to be procured, and on such a scale, as to admit of the exhibition of details of construction. Farther, similar models exhibiting the underground arrangements of the mine, the means of ventilation, whether by shafts or machines, of keeping the mines free from water, of conveying and raising to the surface the rough material, and generally such other practical details as it may be possible to represent in this manner, would prove most useful. It would, I conceive, be perfectly practicable for a person familiar with the subject, and with modelling, to represent in a single model, the entire series of details now adverted to, and although such a model might prove expensive, yet since the information to be derived from it, would be in every respect of more practical benefit than that afforded by drawings, or oral or written descriptions, I do not think a complete Museum of Economic Geology ought to be without something of the kind. Models of the most approved forms of miner's tools would also be most useful ; and since blasting with gunpowder is constantly had recourse to in all extensive mining operations, the series of tools necessary for that purpose may be annexed. Arrangements of a nature similar to those just detailed,

Means of illustrating processes of Metallurgy and practical details of Coal Mining.

would be necessary to the illustration of practical coal mining. In reference to this branch of the subject, it may be remarked, that the strongest evidence of the necessity of taking effective measures to extend an acquaintance with the practical details of coal working, may be found in nearly every page of the valuable and interesting report of the Coal Committee, and from these documents, the most authentic as well as extensive records we possess of Indian mining operations it may be learnt, that to deficiency in this respect, combined with neglect of proper investigation of the fields themselves, the feeble success of our coal mines is chiefly to be traced. With new fields opening to us in the North-Western Provinces, it becomes us to follow another course, and by taking measures to disseminate practical information, and also by careful examinations of the deposits that may be discovered, to guarantee, as far as we can, its legitimate return to invested capital, and to enterprize its merited reward. The survey of a newly discovered coal field being conducted either by the sinking of shafts, or as is in every respect superior, by the employment of the method of boring, it is advisable to represent the tools and working apparatus required for the latter operation in model, as part of the illustrations of the department under notice. There would be the less difficulty in doing this, since the whole series is in this country, and unless recently removed, is, I believe, lodged in the arsenal of Fort William. In a former paragraph, the propriety of having a complete suite of characteristic specimens of the varieties of coal was alluded to, and these, combined with the series of illustrative models, would afford a most useful study to individuals desirous, either of prosecuting or directing coal-working operations. There are certain subordinate points, as for example, the kinds of furnaces best calculated for the different varieties of coal, the uses to which inferior descriptions of the mineral, as those highly impregnated with pyrites, may be put, &c. &c. on which information may be conveyed with advantage. Time must elapse ere the Museum for the North-Western Provinces could be complete in the practical departments now being noticed; but in a few years, provided its objects are energetically pursued, it may be expected to become an institution of the highest utility to this part of the country, and will I have no doubt, realise the expectations that have been formed of it, both in regard to its economic and scientific importance.

7. The next department of the Museum, on the arrangements of which I would make a few remarks, is that of **Architecture and Civil Engineering**; in which are included the various applications of the rocks composing the earth's crust, to the purposes of common or hydraulic architecture; of road-making, in the formation of mortars or of cements. Since each of the great systems or series of rocks, formed the distinct epochs that have been recognised by geologists furnish materials adapted to some of the preceding objects, it would be well to place in the Museum, a suite of characteristic specimens of the individual rocks composing these systems, arranged according to that order of superposition, which has been found to prevail among them in nature. It is, however, to be remarked, that those lithological characters of rocks, on which their applicability to the purposes of the architect and engineer is dependent, vary so much in different localities, that although a particular rock may, in one country, be admirably adapted to such purposes, it by no means follows, that its equivalent in another, must be equally so. Hence, although it would be useful in aiding research, to have in the Museum such a collection of specimens as I have above averted to, yet in this department our chief object should be to procure, with the least possible delay, a collection of native, not exotic rocks. It is by the investigation of the physical and chemical properties of the former, that information available for practical purposes in this country, is to be procured; and although comparison of these results with others obtained elsewhere would, of course, be interesting, and in time might be instituted, it is I consider, of secondary importance. Specimens, therefore, of all natural products, employed in the department of Public Works, whether as building materials, road materials, or materials for making mortars and cements, ought to be procured for the Museum, and their properties experimentally investigated.

Considering the extent to which Public Works are now carried on, and the number of intelligent individuals employed upon them, it cannot be doubted that a large amount of information, specially relating to the department of Economic Geology under notice, exists in the community; and were the Museum established, it would prove the means of concentrating this for general bene-



fit and use. In process of time, when specimens and information had accumulated to such an extent, that the resources of the different districts whence they had been procured were duly represented by them, it would be practicable to construct a map of these Provinces, from which would be gathered at once, the extent of means available for Public Works in any given localities, and much aid afforded to officers deputed to conduct such works, to whom the districts might be unknown. Beyond the simple facts of rocks having been extensively used as materials for different purposes in our Public Works, and having in several instances been found most useful, we possess no farther information regarding them. No definite details of their physical or chemical properties, of their power of cohesion, adhesion or absorption ; of their mineral characters, geological relations or component, parts have ever been furnished, and till we know something of these, we can form but very indefinite estimates of the real economic value of any materials we may have at command. To accumulate information on the points just mentioned, and to encourage farther investigation, so that the sites of new materials may be discovered, will be regarded as objects of higher moment, when it is borne in mind, how intimately the agriculture, and consequently the revenue of these provinces is dependant on the facilities, with which works for the purpose of irrigation can be executed, and how extensively the materials alluded to, are employed in the execution of these works. In like manner, the interests of trade afford a motive for encouraging investigations, relative to the materials for the construction of roads, so that viewed generally, the prosperity of the country is intimately connected with the effective illustration of this department of the Museum. The properties possessed by sandstones, limestones, or dolomites, fit them best for the purposes of building, and those possessed by rocks of igneous origin, as trap, or basalt, for road-making ; hence both classes become of economic importance, and ought to have place in the Museum. For the illustration of the mortars and cement, specimens of the materials employed in their formation, from the pure limestone, to the impure argillaceous kunker, together with models of the best forms of kilns for burning, and of mills for crushing, ought to be provided, and would, I think, complete this department of the Museum.



8. The importance of the department of agriculture in the Economic Geology of the North-Western Provinces is so great, that we can scarcely be too anxious to insure its effective illustration and development. Under it may be included investigations of the geological relations, the chemical composition, and the capabilities of different soils, of the influence exerted upon these by waters of irrigation, natural and artificial, and of the nature and effects of the application of varieties of mineral manure. To illustrate the geological relations of the soils of these provinces, specimens of the rocks that may be found to underlie them, and from which their mineral constituents may have been derived, ought to be procured for the Museum. There are of course many localities, as the great alluvial districts, and the valleys of the great rivers of India, the soils of which can be referred to no particular derivative rocks, but which have been derived from many sources, yet where such rocks do occur, a most intimate relation necessarily subsists between them and the soils to which their disintegration, by natural causes, has given origin. It is this relation which gives so much of their value to the geological maps of districts, and render them of so much utility to the scientific agriculturist. From those localities, therefore, in which particular kinds of soils may be observed, specimens of the soil itself, of the underlying rock or stratum, and also of the sub-soil, or portion intervening between the soil and rock, and exhibiting the gradual transition from the one to the other, ought to be forwarded to the Museum, and there systematically arranged. As in the previous department of Architecture and Civil Engineering, so in this, materials would so accumulate in process of time, as to make it possible to construct a map, exhibiting the distribution of soils in the North-Western Provinces, a work at once interesting and useful. Since the staple vegetable products of this country are common to it, and to many distant parts of the earth's surface, it would be of the highest interest and importance, to be enabled to compare the soils sustaining them here, with those from which they may there be produced. Hence these specimens of such soils from tracts producing articles similar to our own, ought to be obtained to as great an extent as may be practicable. The analysis of these might be expected to yield us information as to the peculiar principles on which their adaptation to

particular products was dependent, and might suggest experimental inquiries as to the improvements of our native soils, the results of which could scarcely fail to influence beneficially the general interests of the country. It is to be remarked, that as certain portions of a soil are withdrawn from it for the sustenance of the products reared upon it, so its analysis, to afford the most useful results, ought, I conceive, to be made both before the seed was sown, and after the harvest had been reaped. The results of simple analysis, however, although most important, are by no means the sole requisites for enabling us to compare soils, the fertility and adaptations of these being the effects of many conjoint causes; as the physical aspect, the atmospheric relations of temperature, moisture, exposure of the districts from which they may be obtained, and also the nature of the deposits from, or the chemical constituents of, the waters employed to irrigate them. In illustration of this last mentioned point, it would I think be advisable, that specimens of soils from districts in the North-Western Provinces should be accompanied by others of the waters of irrigation, whether derived from springs, rivers, wells, tanks, or artificial canals and water-courses. An experimental investigation of them, both as regards the matter held in simple mechanical suspension, or in chemical solution by them, would always furnish us with most interesting information, and in some instances, might enable us to detect the source either of the peculiar fertility or sterility of the soils in certain localities. Specimens of the various kinds of mineral manures employed in this country, and also in other countries, from which it may be possible to procure them, together with those of soils to which they may have been applied with success, would complete, I think, the illustrations of this department of the Museum; and on being subjected to the same process of analysis as in the preceding instances, might be expected to add, in an important measure, to the information previously collected. It will be observed how essential the aid of the chemical laboratory recommended in a former paragraph, is to the effective illustration of this department, since without it, those researches which promise to cast light upon the principles by which the practical operations of agriculture are influenced could never be undertaken; nor could we ever expect to replace the empirical rules, by which agriculturists are now guided, and often guided wrong, by general laws induced from

carefully observed phenomena, the only sure foundation on which the philosophy of agriculture can be reared.

9. Since the earths, alumina and silica, constitute the basis of all descriptions of Pottery, from the common earthen-ware vessel to the Porcelain vase, the rough materials for such manufactures will be found wherever silicious and aluminous rocks prevail. These are by far the most extensively diffused in nature, and there are indeed but few rocks into which the earths above mentioned do not enter in greater or less proportions. From the circumstance, however, that the simple minerals composing rocks of the granitic and felspathic classes furnish silica and alumina, both in greater abundance and more purity than usual, it is from them that materials are most frequently procured for the higher descriptions of Pottery, as Porcelain and China-wares. Thus, the celebrated Kaolin, or Porcelain earth of the Chinese, is simply a result of the disintegration of granitic rocks, and has been found abundantly in Southern India, where these largely prevail, while for the use of the Staffordshire Potteries, immense quantities of Scotch and Welsh granites and feldspars are imported. From the geographical extent of the North-Western Provinces, it may be expected, that rocks of the classes above adverted to, will be found in many localities, and from these specimens of the rocks themselves, and of the result of their disintegration ought to be forwarded to the Museum, where an investigation of their properties would be made. But it is not to the mere exhibition of the materials best adapted for manufactures in the different varieties of Pottery, or to the diffusion of information relative to these alone, that this department of the Museum ought to be confined. If we desire to raise the standard of our Indian Pottery manufactures, we must endeavour not only to supply good materials and improved processes of manipulation, but also to correct and elevate the *taste*, by which the use of these is to be regulated. To effect these objects, measures ought to be taken to procure for the illustration of this department, specimens from our English Potteries, exhibiting each successive process in the formation of articles in Porcelain or Stone-ware, from the first appearance of the rough material, to its production in a state fit for use or ornament. Accompanying these, should it be practicable to obtain them, ought to be model representa-

Managements of  
the department of  
Pottery and Glass  
Manufactures.

tions of the apparatus or machinery employed in preparing the material in any of the processes alluded to. Examples also of the varieties of manufacture, selected with the view of their being presented to native workmen as models for imitation, ought also, I conceive, to be procured for this department; in the higher and ornamental descriptions of Pottery such specimens ought, of course, to be chosen as may be distinguished for beauty of design, both in relation to form and embellishment, so that the purest models may be presented for study, and some perception of the truly chaste and beautiful infused, if possible, into the native mind. I would only add on this subject, that the specimens of Indian Pottery exhibited in the decorations of native temples and palaces, display such an extent of knowledge in the simple process of manufacture, and in the nature and methods of applying colouring materials, as to encourage the belief, that were the standard of taste corrected and refined, this improvement would be rapid and important. A series of illustrations of our manufactures in Glass, similar to that recommended for those in Pottery, might be expected to call attention to a department of industry, for which the requisite materials exist in abundance in these Provinces; but which I believe has hitherto been followed only to a most limited extent.

10. Intimately associated with the preceding, as furnishing to the Porcelain painter or Glass stainer, the materials

Arrangements of  
the department of  
Mineral Pigments  
and Dyes.

required for the completion of his designs, is the department of Mineral Pigments. This however is

by no means limited to manufactures, it extends also to the arts, and to the more common applications of painting, for both of which it furnishes some of the most important colours required. It is only necessary at present to refer, as examples, to the chromates of iron and lead, the various ores of cobalt and manganese, in Porcelain painting, and different departments in glass manufacture; to the pure and impure bi-sulphurets of mercury or vermilion and cinnabar; to the arseniates of sulphur, or red and yellow orpiment, in the arts; and to the sulphate, blue and green carbonates of copper, the colcothar or oxide of iron, sulphate of zinc, in the more common varieties of painting. There is farther, a large class of colouring materials derived from combinations of the foregoing, and others in various proportions, as smalt, from the mixture of the ores of cobalt with silica and potassa,



red, yellow, and green colours from that of the chromate of iron with oxides of other metals. For the illustration of the department of mineral pigments, specimens, therefore, of the various simple pigments, found in nature, and the compound ones formed by art, ought to be procured. When attention has been attracted to this branch of the subject, we may anticipate the development of information relative to native colouring materials and modes of applying them, that could not fail to prove both interesting and useful. With the department under notice, I have associated that of mineral dyes, because many minerals included in the one, belong also to the other. A similar series of illustrations would be requisite for the dyes as for the pigments, and similar results might be anticipated from their investigation as employed in native manufactures.

11. Under this department of the Economic Geology of a country, Department of Mineral Springs. are included the different kinds of mineral springs or waters that may be found in it. These are important, not only as holding in suspension or combination certain mineral products applicable to economical purposes, but also in their scientific relations, and especially in their connection with the geological structure of the district in which they may be found. The occurrence of mineral springs is almost invariably characteristic of the action of disturbing forces, and it is in those districts, where such forces have been most active, that they are found in the greatest abundance. When they are thermal as well as mineral, their interest in a scientific point of view, is much increased; and I may remark, it would be an important contribution to the materials already collected for the investigation of the subject of interior terrestrial temperature, were the thermal conditions of such springs of this class as either have been, or may, yet be discovered in India, investigated with care, and in detail. In the department under notice, are also included those springs of petroleum, naphtha, or the impurer bituminous products which have already been found in several parts of India, and which we may hope to find in the North-Western Provinces also, when the Himalayan coal fields have been more thoroughly examined. Specimens of all mineral springs, whether bituminous, chalybeate, sulphureous, alkaline, saline, or acidulous, that may be discovered in these provinces, ought to be forwarded to the Museum, where they would be examined, and their economic value ascertained.



12. It is unnecessary for me to do more than simply to allude to the department of Mineral Medicines. It has, I believe, in common with the other branches of the *Materia Medica* of India, been carefully investigated by a Government Committee, and it may therefore be concluded, that little difficulty will be found in obtaining such information, as may enable us to illustrate, by specimens, the resources of the North-Western Provinces in this useful and interesting department of the Museum.

13. There are other instances besides those to which specific allusion has now been made, in which geological principles or mineral substances, are made subservient to economical purposes; as an example of the former, the theory and practice of the Artesian method of well-sinking may be mentioned, and of the latter, certain processes in metallic manufactures, in soap-making, bleaching, &c. I am unwilling, however, to extend this memorandum by any details relating to these, since with the exception of the first mentioned, they are of minor importance. The method of boring employed in sinking Artesian wells, has already been adverted to in a former paragraph, and measures for its illustration therein recommended. I would now, therefore, only recapitulate here the several departments with which the measure has been subdivided, and conclude with a few remarks on certain collateral measures to be adopted, for increasing the utility of the institutions. The departments are—

1. Mineralogy,
2. Architecture and Civil Engineering,
3. Agriculture,
4. Pottery and Glass Manufactures,
5. Mineral Pigments and Dyes,
6. Mineral Springs,
7. Mineral Medicines,
8. Miscellaneous.

14. In order to furnish specific information to those persons, who may be willing to forward the objects of the Museum, relative to the points to which their attention ought to be directed, it is proposed to circulate extensively tabular forms, or when more appropriate, lists of queries, exhibiting the *desiderata* in each of the preceding departments. Some progress had been made in the preparation of these,

when sudden illness interrupted it. I trust, however, ere long, to be able to submit the series for the consideration of the Asiatic Society. The information obtained by the means above alluded to, ought to be embodied in the periodical reports of the Curator of the Museum, and made public, either directly, or through the medium of the *Journal of the Asiatic Society*, as may be thought most advisable. It is possible that the Society may be able to render farther aid to the Museum, by transferring to it, duplicate specimens of minerals, rocks, &c. or otherwise to give it such assistance as an institution, which if established at all, will be so by its recommendation, and in immediate connection with it, may be considered entitled to. Those means of illustration in several of the departments, which it will be necessary to procure from England, may, I presume, be obtained through the influence of the Court of Directors, which, by the establishment of the Museum of Economic Geology in Calcutta, has given the strongest proof of the interest felt by it in the subject, and of its willingness to aid practically, its development in this country. By the Curator of the Museum placing himself in communication with learned societies in other countries, much interesting information relative to the economical applications of their mineral products might be obtained, and rendered available for useful purposes here.

15. It only remains for me to add, in conclusion, that from the circumstances under which this memorandum has been prepared, I fear that some points of importance may have escaped notice entirely, and that others may have been imperfectly discussed. Such defects will, however, be rectified by those, under whose consideration these remarks will come, and I will most gladly avail myself of their wider experience, and more extensive information, to correct or extend the views herein expressed.

*6th September, 1841.*

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II

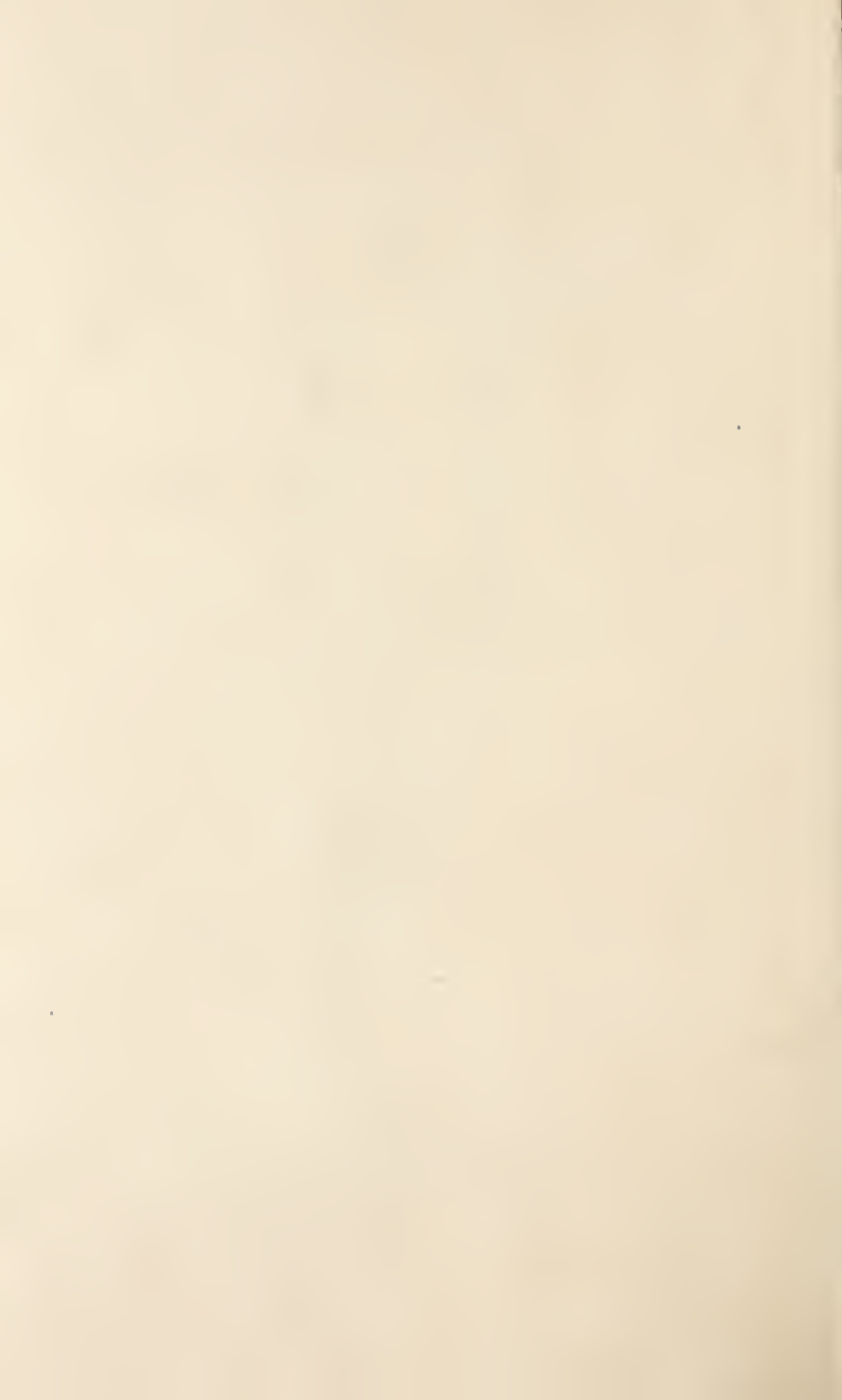
I



1 Tail from above showing the whole gland and its two pores. hair of pump turned off. II Oblique lateral view of tail with one pore fully revealed

11 meses of distended thighs. 2 tail from below & anus 3 taster 2.1. musk pod. N.D. the posterior of the two apertures between these numerals is that of the penis - the anterior, that of the pod.

$\frac{2}{3}$  Nat. Size



*On a new Organ in the Genus Moschus.* By B. H. HODGSON, Esq.  
Resident at the Court of Nepal.

That accomplished naturalist, Mr. Gray, gave, five years ago, in the Zoological Journal, some observations on the Genus *Moschus* of Linn. in the course of which, after remarking that the great Swede's genus was characterised by himself merely by the absence of horns, Mr. Gray suggested some further marks of distinction for the genus. Mr. Gray divided the genus into three subgenera, and discriminates the Musks proper by their coarse pelage, their simple and clad metatarsus, their throats undenuded of hair, and the peculiar pouch in which the musky secretion is found.

Without staying at present to remark upon these diagnostics, it will readily be allowed, that most of them are not so important, but the addition of another decided and organic one must be hailed with satisfaction; and I therefore proceed summarily to describe, what the pencil of my painter has made the description of almost superfluous by the accompanying drawings. The very short tail of the proper Musks has often been remarked on; but it has not been, so far as I am aware, noticed, that this short tail is the seat of a secreting apparatus as marked and peculiar in character, as the celebrated preputial pouch. The tail is rather more than an inch long, and nearly as wide at its base as long, trigonal, depressed, and nude, especially on the upper surface, far *below* it is (like the proximate margin of anus,) partially covered with soft hair. At the very apex, there is a tuft of hair as harsh and quill-like as that of the body generally! and this tuft only is seen in the living animal, the rest of the tail being hid by the hair of the rump. Raise that hair, however, and you at once perceive the real tail, flat-looking, nude, thick, and greasy, whilst around it the hairs are glued together with a viscid liquor, which has become more or less dried and candied here and there. Look closer, and you discern that the whole tail, especially on its superior surface, consists in fact of a hard solid gland, about three-eighths to half an inch thick, which secretes the viscid humour in question, and gives it off slowly, but without intermission, by means of two lateral pores. These pores consist of longitudinal folds of the skin, about as deep as the thickness of the gland, and about three-quarters of an inch long. They are narrowly elliptical in form, possessing thick, rounded, but not very mobile lips or edges, and they resemble in



the general character, the suborbital pits of the Rusa Deer, when periodically excited, or yet more nearly, the frontal pits of the Muntjac under similar excitement; and, lastly, these caudal pores have a basal and marginal position, one on each side of the tail. If you press hard on the gland, the secretion is protruded through the pores in a thick state, like vermicelli; but it ordinarily passes off by the pores in a more liquid state like melted honey, becoming hard and candied as it dries on the edges of the pores. It seems always to be secreted and always to pass slowly off. It has a strong, peculiar, and rather offensive odour, not at all musky; and by its abundance, and the regular apparatus for its formation and discharge, must be of high, though I know not of what, importance to the animal. I noticed it first a year ago, and have since examined it in two other specimens, one live, and the other just dead. The first subject was submitted to Dr. Christie's inspection, who can confirm all that I have stated. My *fresh* specimens of these animals are of the more ordinary and uniformly dark species, called by me, *Saturatus*. But, so far as a judgment may be safely formed from dried skins, the other species, or *Chrysogaster* and *Leucogaster*, possess a similar organ, which therefore would appear to belong to the whole of the Musks Proper. These animals, I may add, are further distinguished by the absence, not only of suborbital and inguinal, but also of interdigital pores, and by hoofs and false hoofs, as long and pointed almost as spikes; not to mention that remarkable pouch, in which the musky substance itself is collected, and of which, as more talked of than understood, I subjoin a sketch, in addition to the ones exclusively dedicated to the illustration of the caudal gland and pores.

B. H. HODGSON.

*Nepal, July, 1841.*

P.S.—Should this paper fall under the eye of Mr. Ogilvy, I beg to let that gentleman know, that when I published my description of the three species of *Moschus* to which he adverts, I had been long familiar with the ordinary effects of nonage upon the colour of the common species of this genus, of whose parturition and gestation I had, years previously, given a particular account in print.\* Mr. Ogilvy's scepticism, therefore, is not better founded in this instance, than in some others, as he must pardon me for saying.

\* Vide Gleanings in Science.

*Extracts from a Report on subjects connected with Affghanistan. By*

DR. GRIFFITHS, *communicated to the Editor, from the office of the Political Secretariat of India.*

*Forests.*—The nearest wooded part of the Sufaid Koh to Cabul is Taizeen, a distance of three marches, including, at least by the common route, a steep pass, the Huft Kothal, some 3,000 feet in height. In the direction of Cabul, there does not appear to be any water-carriage available for the transport of the timber of the Sufaid Koh. Cabul may therefore be said to be in a considerable measure beyond the reach of an efficient supply of good and durable timber.

Candahar and Ghuzni may be said to be absolutely beyond the reach of any indigenous supply, no forests occurring within any practicable, if within any distance. The forests of the Sufaid Koh consist of various kinds of Fir, among which the Deodar is abundant; the Cheel or *Pinus longifolia* also I believe occurs, as well as the Chilghozeh, which from the abundance of the seeds, sold or exposed for sale, must be common. The seeds of this appear to resemble exactly the seeds of the Kunawur *Pinus Gerardiana*; it will be interesting to ascertain whether the trees are identical; if so, it will not be the only instance of affinity between the Floras of the two countries. These forests likewise contain the Baloot, a species of Oak; the Zaitoon, a species of Olive; the Sehnee, and two or three others. I am not personally acquainted with the trees of this range. Captain Burn, commanding the Khybur rangers, one of the few who had ascended the lower ranges, informed me, that the Baloot and long-leaved Fir were common. The chief tree on the Taizeen ridges is the Deodar. It is very unfortunate, that from this great range, there does not appear to be available water-carriage in any direction, at least to the northward. The only forests, with which I am tolerably acquainted, are those about Olipore, in which direction the mountains, as I have more than once observed, assume the Himalayan features. The principal trees of these mountains, always excepting the neighbouring ones of Kafiristan, are the Deodar or Nokhtur, the Zaitoon, and the Baloot. There is perhaps another species of Oak, but, so far as I know, there is no other Fir tree. The distribution of the forests may be stated as follows: the Baloot ranges from the bed of the river to an elevation of 2,000 feet above it, or 4,500 feet above the sea. It commences to be mixed with Zaitoon towards its upper limits; and is

soon supplanted by it, the Zaitoon forming the chief, if not the only part of the forests, as far as the lower limit of the Deodar, at an elevation of 6,500 feet above the sea.

Between this and the summits of the ridges which attain a height of about 10,000 feet, the Deodar rules supremely vast in abundance and in size. These forests may be considered as available for Jilalabad and Peshawur.

As the valley of Olipore is very narrow, and the lowest, which is a considerable one, sweeps in many places under the Oak forests along its right bank; this timber could be supplied effectually.

The tree, however, does not reach any size near its lower limit of distribution. Greater labour, and a proportionally greater expense would be required to supply the two others in proportion to their distribution.

There is perhaps but little prospect of the country about Jilalabad arriving at much importance. A small supply of timber may be demanded by Europeans, but Jilalabad, from its extreme heat, can scarcely become their residence except for the winter months.

The forests of Olipore are therefore of comparatively little use, and will probably remain so, until Peshawur assumes its real importance. The want of timber about Candahar, though not, if I recollect rightly, in the city itself, is remedied by the construction of the houses, which are generally domed. The houses of Cabul are extremely slight, built of mud and small timbers; these are supplied exclusively almost by the Poplars, which are planted in many places along the banks of the Logor and Cabul rivers, by which they are carried towards the city during the floods. This timber is white, and very soft; it does not enjoy fair chances, for the trees are planted so close together, that they not unfrequently grow together, and they are cut prematurely.

They are quite unfit for building purposes, and some idea may be formed of their perishableness, when it is said that Cabul is renewed once in every 25 years.

I have already mentioned that the great majority of the cultivated

The only other trees besides the fruit trees known to me, are three or four kinds of Poplar, three or four of Willows, and the Hawthorn. In Baben's garden, there are many very fine Poplars.

trees are fruit trees; these are for many reasons not available for the purposes of timber.

The great bulk of the vegetable fuel is supplied by the low bushes, chiefly species of *Artemisia*, that occur commonly in the barren parts of the

country. They are not good fuel, except perhaps for particular purposes, having no bulk, and burning very rapidly. They are, I believe, chiefly used by the bakers, and the loads, carried generally on asses, constitute not one of the least nuisances of the crowded and confined streets of Cabul. From Taizeen supplies of Baloot branches are brought to Cabul, as well as a good deal of charcoal prepared from it and the Deodar. But the price is enormous. I have heard officers say, that the daily expense for fuel, during the severity of winter, was not unfrequently three rupees.

Nevertheless, the experiment might be tried with some of the indigenous trees, on the better parts of these same slopes. Attention should, I think, be chiefly directed to the Baloot, which is the only tree that has striven to establish itself on the barrenness of an Affghan mountain. The Zaitoon and Deodars of Olipore cease abruptly, the Baloot struggles on from Koonur to Taizeen.

The growth of the timber trees now cultivated should be discouraged as much as possible, as soon as efficient European timber trees have been introduced. This may be a matter of time, but scarcely of difficulty, considering the state of perfection the overland interchanges of seeds between Drs. Royle and Falconer. I have appended to the report a list of the various desiderata.

In all the lower parts of the country the best of the timber trees of the dry plains of the N. W. might be introduced. In such parts as about the Koonur valley, the Sissoo is occasionally met with; to it the Seriss, Jamun, Kikhur, &c. might advantageously be added. Around each of the main places in the country, small plantations might advantageously be made, particularly of such timber trees as are best adapted for the purposes of military arsenals. Thus at Jilalabad and Candahar, the Sissoo might be planted with reasonable prospects of success; for the supply of Cabul and Ghuzni we must look to Europe and the Himalayahs. At present I know, it is next to impossible to repair or construct properly a gun-carriage; the Plane tree is the only available one, and besides not possessing even ordinary merit, is procurable with difficulty. I cannot offer any particular suggestion towards supplying Candahar with fuel; with regard to Cabul, I may be allowed to suggest a comprehensive survey of the Taizeen forests, and of the other wooded portions of the Sufaid Koh in that direction; particular



respect being paid to their communications with Cabul. At present the line of road for any beast of burden, but a mule or a donkey, is very circuitous and arduous. The dealers in wood and charcoal, however, instead of turning the range which forms the south boundary of the valley of Cabul itself, cross it near the place where the large Bactrian pillar, now called Baber's Pillar is situated; by this they *debouche* immediately into the valley of Kooro Cabul, saving a circuit of several miles, and preferring shortness and great steepness, to length and comparative levelness. A new line might possibly be marked out. The grand remedy will be found when good and accessible coal shall have been discovered; this is one of the greatest desiderata, and search for it should be proportionally encouraged.

Affghanistan is a country of mountains intersected by vallies, or as Physical features of Afghanistan. some may perhaps be called, steppes. It appears to me to possess many peculiarities, and my limited experience cannot suggest a country, with which it may fairly be compared. A popular general idea of it may be formed by imagining, the upheaving of an extensive and varied system of mountains, through an enormous plain variously covered with boulders and shingle, and presenting here and there deposits of soil, generally in the shape of narrow strips along the principal lines of drainage. The general form of the country as now limited, may be compared to that of an equilateral triangle. Its boundaries are undoubtedly the Indus along the Southern line; the Koh-i-Baba, Paropamisus, and Hindoo Koosh along the North-Eastern; Persia, Seistan, and the territories of Khilat along the Western.

Of the above-mentioned boundaries, those of the North-Eastern and Southern or South-Eastern sides are natural in the strict sense of the term; those on the Western sides are badly supplied by the changeable and arbitrary boundaries of Beloochistan and Persia.

The mountains may, I think, be said to belong to two great systems, Mountains. that of the Hindoo Koosh, Koh-i-Baba, and Paropamisus, which appear to be nothing but different parts of the westerly continuation of the great Himalayan chain, and the Sufaid Koh. This is, however, connected with certain of the extreme southerly offsets of the end of the Himalayas, or beginning of the Hindoo Koosh. To one or the other of these systems all the subor-



dinate ranges may, I think, be traced: although I have no personal acquaintance with the countries between Candahar and Ghuzni, and the Southerly prolongation of the Sufaid Koh. The true mountain, Hindoo Koosh, for this name has been laxly applied to the whole See Burnes' Travels. range, is situated nearly due north of Cabul. I have no personal acquaintance with it. The higher peaks of this chain always present traces of snow, and are visible from some points about Cabul. I am not acquainted with the exact point in which the Himalayas assume the name of the Hindoo Koosh; but I have grounds for believing, that the features of the Himalayas are not changed at Olipore, Lat.  $34^{\circ} 54' 38''$  N. Long.  $70^{\circ} 12'$  E. The Kohi Baba is a direct continuation of the Hindoo Koosh, from which it appears to be separated at first by the Kaloo torrent, and then by the united Kaloo torrent and Bamean river. On either side of these lines, which appear to be the deepest lines of separation, numerous and very varied offsets from both ranges occur. It is over these intermediate portions, that the best routes to Bamean pass, the highest point traversed, is the Erak pass, which reaches an altitude of 13,000 feet. But the best route, one which is said to be more easily practicable for artillery, and open throughout the year, is through the country of the Shaikh Ali Huzaras, this probably does not pass over ground exceeding 9,000 feet in altitude.

The eastern end of the Koh-i-Baba, or its commencement, is certainly grand; a magnificent view of its three snow-clad peaks is enjoyed from a pass between Yomurt and the Helmund river. Its extreme eastern part shews itself in the form of a vast rounded mass on approaching it up the Siah Sing torrent; but to the west, it rapidly assumes a different appearance, presenting a succession of lofty peaks, as far as the eye can reach. In this direction it loses itself, and I believe becomes diminished in the Paropamisus. Snow exists on its eastern portion throughout the year; in sheltered places it occurs in beds of considerable size.

In August 1840, I ascended this range near Kilah-i-Kaloo, up to 13,500 feet. No change in the usual features occurred, but from that altitude the ascent became much steeper, and was rendered much more difficult by the ruins of enormous slips.

With all my endeavours I was only able to reach the general level of the connections of the peaks; these were completely inaccessible,

the nearest did not appear to be more than 1,000 or 1,500 feet higher than the spot on which I stood. Patches of snow commenced about sheltered situations at 13,500 feet, and towards the summit beds occurred, except in the most exposed spots. The upper portion of the range appeared entirely bare, the surface consisting of nothing but angular fragments of the rock, of which the peaks are composed. The snow in the upper beds was wrought, if I may so express myself, by the action of frost and thaw into pinnacles, which during sunshine, presented thousands of glittering objects. The few plants found above 13,500 feet were different from any that I had met with elsewhere; the only animals observed were a large hare, and a covey of the snow grouse, Koki-i-dusrah of Affghanistan, the Tehoo or Gallus Neillii of Mr. Gould. The general character of the Koh-i-Baba is great barrenness, this it shares, I have been told, with the Hindoo Koosh, and generally with the Paropamisus, of which portion I have not much direct knowledge. To these three ranges, the Hindoo Koosh, the Koh-i-Baba, and Paropamisus, and perhaps with the western extremity of the Himalyas Proper, I should be disposed to assign all the ranges to the north of the valleys of Peshawur, Jilalabad, Cabul, Ghuzni, and Candahar.

The Sufaid Koh, or Espeen Gar, which in Pushtoo has the same signification as that of the Persian name, is perhaps as lofty as the Kobi Baba, and like it, although more exposed to the effects of heat and the influence of the great plains of India, presents traces of snow throughout the year. This range is seen to perfection from the valley of Jilalabad, the southern boundary of which it forms. It is continued directly, I believe, down in line with the right bank of the Indus as far as Beloochistan, regaining, as far south as the Tukht-i-Soliman, a considerable portion of its loftiness. The Sufaid Kohi is by no means uniformly bare, as is the case with the previously mentioned mountains; many parts of the southern boundary of the Jilalabad valley are covered with Fir forests. Similar forests occur on other portions, such as those about Taizeen. Fir trees also occurred on certain parts of the return route of the Bombay Army, as I was informed by Lieutenant Marriott, of the Bombay Engineers.

To the Sufaid Kohi, I am disposed to refer all the ranges along the right bank of the Indus, as far perhaps, or farther, than Brahoostan,

and all those to the east or south-east, or south of Cabul, Ghuzni, Candahar and Quettah.\* Of the mountains of the Khilat territory I have no personal knowledge, nor do I know to what system of mountains they are approximately referrible. On surmounting the crest of the Kharlekhir pass, peaks of considerable altitude covered with snow, at that season at least, were seen to the south.

A high mountain, Chiltern, rivalling Tuchatoo in height, towered over the valley of Quettah to the south-westward of the town, but, with what chain this was united, I do not know. It will be readily seen, that this grouping of the Affghan mountains is only approximate, if even this much share of truth can be claimed for it. Mountainous systems, like all others, pass into each other by numerous ramifications: an intimate knowledge of which is only to be attained by close and extensive acquaintance with the features of the country.†

I have before alluded to the barrenness of the Hindoo Koosh and Koh-i-Baba; this is a general characteristic, equally affecting their low offsets and the culminating ridges as far as an altitude of 15,000 feet. This barrenness may be said to be comparatively absolute; that of the barest portions of the lower ranges of the Himalayas between Bhar and Simla is rich and luxuriant clothing, compared with what occurs in Affghanistan. Of the structure of these mountains, I regret not being competent to give an account. Very generally their surfaces are immediately rocky, except in some of the offsets, interposed between the Sufaid Koh and the ranges derived from the Hindoo Koosh, towards the western end of the valley of Jilalabad. There they are composed of sand, in all degrees of softness and induration, in which last state it becomes tabular. Alternating layers of a conglomerate, often exceedingly hard, are to be met with in this sandstone. Exceptions also occur in the valley of Bamean, on both sides of which the offsets are composed of earthy or clayey materials of varied and rather vivid colours. Generally speaking, the Affghan mountains did

\* It is this range that will best repay the trouble of future botanical investigations. Its isolated situation, and its elevation as well as prolongation to the southward, invest it with peculiar interest. From a few specimens brought to me at Khaffal, I apprehend its Flora will approach to that of the Himalayas.

† The appearance of the highest ridges and peaks of both these chains appeared to me to resemble such as I had seen in the far more magnificent Himalayas.

not appear to me difficult of access; in this respect they are widely different from the other mountains I have traversed. It was found to be a general feature, that they might be ascended and descended, by making use of the beds of the draining streams which are very generally dry, except in the season of floods. These ravines, are gently inclined planes, the steep ascent only commencing on reaching their heads; and this perhaps in no instance exceeds 1,200 feet.

A section of an Himalayan ravine may be, I think, correctly taken as wedge-shaped  $\nabla$ , that of the Affghanistan ravines would be a broadly truncated wedge  $\sqcup$ . The base line of an Himalayan ravine is again a succession of steps, with intermediate, more or less level spaces; that of an Affghan ravine is an uninterrupted inclined plane. The bottom of an ordinary hill ravine, again, is generally choked up with fragments, torn from the sides, or by boulders of various sizes rolled down from various distances. The bottom of an Affghan ravine may be in contra-distinction stated, as being almost evenly strewed with moderate sized boulders or shingle.

The vallies, enclosed by these mountain ranges and their innumerable offsets, vary much in altitude, and a good deal in nature, and have been formed perhaps by two different causes.

I am unable to state whether they usually present any definite direction with regard to the mountain ranges, except on the southern face of the Koh-i-Baba, in which direction they are, in the usual manner of the Himalayas, parallel to the chain.

The ordinary form of these valleys is generally very narrow, the tillable soil is confined to a narrow strip along the line of drainage. The space between this portion, and the bases of the outcropping boundary hills is an inclined plane,\* strewed over, and indeed entirely formed of boulders and shingle, generally without a particle of soil. These slopes, very aptly termed by that talented officer Lieutenant Durand, of the Bengal Engineers, glacis slopes, appear to my limited experience, characteristic features in the physical configuration of the country. I beg to subjoin a rude attempt at a sketch of a very

\* Without personal knowledge of the country, it is almost impossible to imagine the extent of these glacis slopes, and the enormous proportion they have to that of the tillable soil.



marked one on the left bank of the Cabul river, below Jilalabad, and opposite the village of Chardeh. As instances of these vallies, I may cite the valley of Shawl, which is not however characteristic; the valleys of the Wighand at Turnah; of the upper parts of the Cabul river; of Jilalabad, and of Koonur. In the only vallies of the Toorkistan face of the Koh-i-Baba, with which I am acquainted, these glacis slopes are not developed to any extent.



*Characteristic Afghan scene north of Chardeh, shewing the glacis slopes, the undulated lower ranges, and the frequently isolated hills.*

The other form of valley, to the existence of which the country is almost entirely indebted for its agricultural produce, are of considerable width, their bottoms are apparently almost level, and entirely covered with tillable soil, except towards the boundary hills along the bases of which glacis slopes very generally occur. Their principal distinction rests therefore on the amount or extent of tillable soil, the proportion of which is reversed in the two forms. As instances of these, I may adduce the valleys of Peshawur, of Candahar, and the vicinity of Cabul, and perhaps the whole line of country between Mookhloor and Nannee, near Ghuzni. Perhaps the best marked instance is the valley to the immediate west of Cabul.

The formation of some of these valleys is easy, and it appears to me naturally explicable by assuming their having been the beds of inlaid lakes. By this assumption it is, I believe, that Dr. Lord has explained the formation of the vallies of Cabul, Jilalabad, and Peshawur, in Dr. Lord's report or account of the Koh-i-Daman, *Journal of the Asiatic Society, June 1838*, will be found some geological speculations, to which I, although not professing any acquaintance with geology, beg



leave to object. The three vallies, cited by Dr. Lord, as having been once large basins, do not, as they now exist, present that amount of similarity of features, or, in other words, of affinity, which chiefly authorises us to ascribe formations to similar agencies. And the only one which, it appears to me, is naturally explicable by the hypothesis of Dr. Lord, is that of Cabul, which presents a tolerable level surface surrounded in every direction by hills. It may even now be said to be a marsh. The valley of Jilalabad presents soil, such as may be imagined to have been a deposit from tranquil water, only along the course of the draining river, which, as Dr. Lord correctly mentions, hugs the northern edge.

Between Bala Bagh and Pigdulluch, which looking to the boundary mountains, appears to me to be the western extremity, or part, rather of the valley; it is, if I may so express myself, blocked up by a low series of sand hills and the table land of Gundamuck, from which there is a descent again, over other sand hills, to Sookhab. -

The space between the southern bank of the river and the Sufaid Koh, or southern boundary, is occupied by an enormous glacis slope, intersected by the northern draining torrents of the range, along and about which, here and there, small and generally well cultivated valleys occur.

If the great valley of Jilalabad, therefore, had ever been occupied by a grand sheet of water, or if it ever presented in other words the features that now characterise the valley of Cabul, great changes must have subsequently occurred.

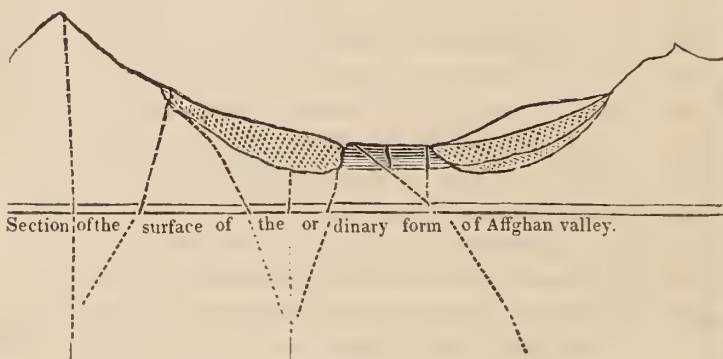
The Khybur pass which was selected by Dr. Lord as the exit to the "mighty rush of waters," did not appear to me to present any greater evidence of unusual water action than did any of the other characteristic passes of the country. Neither can I omit observing, that the assumption of the necessity of more energetic means in former times to enable nature to carry her measures into execution, is not consonant with those modern doctrines which believe, unless I am mistaken, that the causes now in operation in modifying the surface of our planets, are fully competent. The valley of Peshawur, as it now exists, is open freely towards the Indus. The Greedur Galli is a small ravine, presenting fewer traces than usual of the action of water, affording an easy cut across a spur of the

Afredi range, which forms the south-east boundary of the valley. If the water of the great basin selected this as the direction of the least resistance, that part of the valley now open towards the Indus must have since undergone depression. Dr. Lord supports his hypothesis with considerable ingenuity, but he has omitted to observe, that the rolled pebbles of Jumrood are not limited even to the most extensive allowable sphere of action of the rush of the waters of the Jilalabad basin, but form a well-developed belt or glacis slope all round the bases of the boundaries of the valley. Nor does Dr. Lord mention that boulders, constituting glacis slopes, exist on the west side of the Khybur pass, from its mouth to the Cabul river at Dhukka, that is, on the side of, or in that which he assumes to have been, the great basin. If the boulders and shingle, composing these vast extents of glacis slopes are found to have been constituent portions of the ranges of mountains, their formation is, I think, naturally explicable, by the agency of floods, which are no doubt frequent and severe during the spring months. The intimate mixture of the boulders and shingle, by which I mean smaller water-worn stones, which may be observed even to the rather sudden transition to the tillable soil, may be explained perhaps by allowing great inequalities in violence of the floods. But I think I have more than once seen these water-worn stones and boulders lodged on the sides of mountains in situations which would not, as it appears to me, warrant us in the invariable adoption of such an agency, unless I am mistaken. I might especially refer to the sand ranges about Gundamuck, on which, unless my recollection fails me, boulders are abundantly strewn, and which could not have been brought to their present situation by the action of water. It would be, however, useless to speculate further on a point which a practised geologist would determine at a glance. I fear that I have already infringed the principle, that no one is authorised to remark on things he has not studied.

I return to my impressions on the physical features of Affghanistan. This country is also, I think remarkable, always keeping in view that I write, drawing my comparisons from India, the country with which I am better acquainted than any other, for the smallness in number and size of its rivers and streams. From the general dryness of the Rivers and Streams. climate, perhaps many springs cannot be expected, and the summer supply will be almost entirely confined to the streams,

which drain the loftiest ranges on which snow is to be found throughout the year.

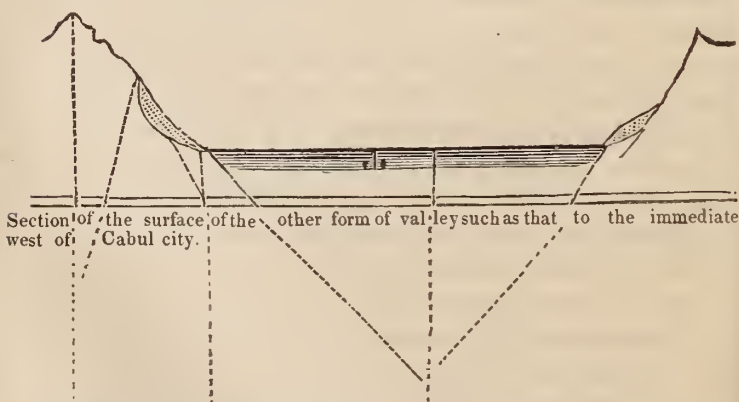
In most of the mountainous parts of India, I have seen almost every ravine give exit to a water-course, but this is not the case in Afghanistan. In the Bolan pass water is plentiful enough, and at Sir-i-Bolan, which the Affghans consider as the head of the pass, a beautiful and copious spring gushes from the rocky southern side of the gorge. But from this to Sinab, a distance of about 24 miles, and where there are *kahreejees*, not a drop of water is procurable, unless rain has very lately fallen.



Boundary mountains usually bare rock.

Glacis slope of boulders and shingle.

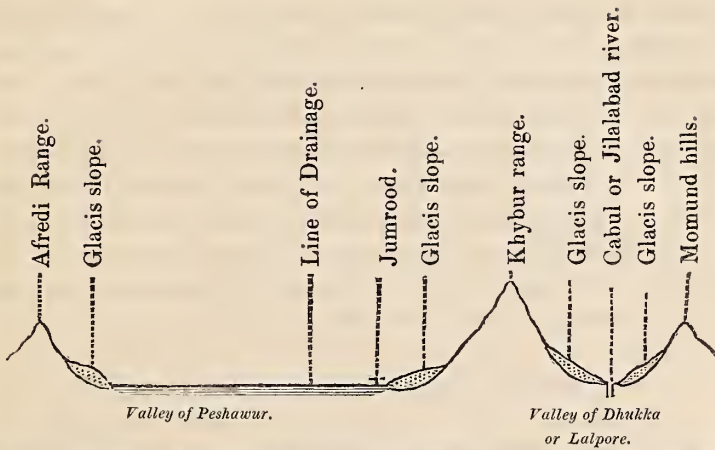
Tillable soil, a strip on either side of the line of drainage.



Rocky boundary mountains.

Glacis slope of boulders and shingle.

Level tillable soil.



Superficial oblique section (not drawn in proportion) of Peshawur valley, of the Khybur range, and valley of Dhukka, to shew that glacis slopes of boulders and shingle exist in the Afredi, as well as the Kybur side of the valley, and as well on the West as on the East side of the Khybur range.

The Kojuck pass is much less supplied; there is a good spring near the head of the ravine up which the road runs, and there is also some water at Chummun, on the north face of the range, 3,000 feet below its crest. But between Chummun and Kelah Abdoolla, no good water is procurable, and even at the last mentioned place the supplies obtained were brackish; the same comparative scarcity occurs in the road to Bamean, above Sir-i-Chusma, and it is only when one arrives within the drainage of the Helmund, that most of the ravines present small supplies of water in the Khybur pass. There is no water until Sundryck-hara is reached; the bed of the ravine by which the army descended from Lol-Ghurree Beg, was found to be dry to within one mile of Ali Mussid, at a place called Sir-i-Chusma, where there are copious supplies from a sort of cavernous limestone. Indeed, this rock seems to be the principal source of the perennial waters of the country in those parts beyond the influence of the melting of the perpetual snows. It is the source of the supply at Sir-i-Bolan; at Mookloor, or the head of the Turnuk; at Sir-i-Chusmah or the head of the Cabul rivers; and the place of the same name I just mentioned as occurring in the Khybur Pass. I, whose journeys had been confined to the North-eastern portions of British India, was particularly struck with the small number of natural

springs. On this depends, I am disposed to think, though perhaps in a secondary point, many of the peculiarities of Affghan vegetation. But few as springs are, and few as streams are, the effect is heightened by the quantities of water expended in irrigation. To this, and in a greater degree to great absorbent powers of soil, is to be attributed the not unfrequent occurrence of the actual disappearance of the streams in Affghanistan, at various distances from their sources. This may be observed both in the Kojuck and Khybur passes.

Before remarking on the only two rivers in the country worthy of any detailed notice, some observations on the lines of drainage may be necessary.

The main lines are two, one easterly, towards the Indus, the other westerly, towards the lake of Seistan; of course in both cases there will be many minor modifications.

After crossing the Bolan range until one arrives within the influence of the Logur, between Ghuzni and Cabul, all the streams observed flowed westerly. From the point mentioned all flowed easterly, and perhaps a line drawn due north from near Sharkabad to the crest of the Koh-i-Baba, will describe the approximate direction of the division of the two lines of drainage now alluded to.

The chief river of Affghanistan is the Helmund, the principal feeder of Helmund River. the celebrated Seistan lake. This river has a course of perhaps 400 miles, and arises in the southern face of the eastern portion of the Koh-i-Baba, or western of the Hindoo Koosh. I have only seen it towards its head, at an elevation of 11,500 feet; it is at Girdun Dewar, where it is crossed going to Bamean from Cabul, by a small river, knee-deep in the cold weather. At Girishk, the Helmund is a large and a rapid river. I am not aware whether this river is ever made use of for the purposes of descent; the only use, so far as intercourse is concerned, that the collected waters of so variously levelled a country can be put to. But connected with the small distance of Girishk from Candahar, (40 miles,) the valley of the Helmund is worthy of being surveyed, with a view of ascertaining its mineral resources. Connected too with the subject of wool, its capabilities of affording a rapid means of descent to within 40 miles of the second place in the country should not be lost sight of, more particularly if any of the upper parts of the valley are great sheep resorts during the shearing season. Were



there any reasons for supposing that forests of any description existed in the same direction, an enquiry would be still more necessitated.

The only other river I shall notice at much length is the Cabul  
Cabul River. river, by which name the large body of water that falls into the Indus just above Attock, appears to be generally known. This river has its chief origin from a copious spring at Sir-i-Chusmah, about 37 miles to the east of Cabul. It drains the well cultivated Mydan valley, but is quite insignificant until it joins the Logur in the valley of Cabul, and even here it is easily fordable. On leaving the valley of Cabul, it enters a mountainous district through which it continues to flow, until it emerges into the valley of Jilalabad, near Baler Bagh, where it receives the Soorkhab, a considerable tributary arising in the Sufaid Koh.

At Jilalabad, the Cabul river is of considerable size, and of a mountainous character; two or three miles below Jilalabad, it is joined by the large river which drains the Koonur valley, and which is known, I believe, by the name of Rania in the lower parts of its course, and of Koonur in the upper. The Cabul river then ceases to be fordable; it continues to hug the northern side of the Jilalabad valley, until it enters the Momund hills, which connect the offsets of the Sufaid Koh with those of the Hindoo Koosh, or western parts of great Himalaya, at the Abkharah, a few miles below Dhukka.

It continues to be confined by these, until at Mucharr it emerges into the valley of Peshawur.

From Sir-i-Chusmah to Jilalabad, this river is of no importance except agriculturally. But from Jilalabad to Peshawur it assumes an additional importance, by affording means of safe, and generally rapid descent. For this purpose it is navigated by rafts, floated on inflated skins, the only mode resorted to by the Affghans, except at Lalpore, where the ferry is carried on by means of one large boat. These rafts are perhaps the safest possible conveyance, and are admirably adapted to such rivers as those of Affghanistan. They are very buoyant, and some of the skins may be burst without causing danger. Indeed, if care be taken in properly securing the frame-work, a serious accident can scarcely occur.

Descent by this river is a good deal resorted to, especially when the Khybur pass used to be disturbed. It saves a distance of ten marches,

and when the Indus becomes a channel of greater traffic, it will be probably by this route, that most of the exports will leave the country; for the rafts would experience no difficulty in proceeding to Kalabagh, and there discharging their loads into the boats of the Indus. The rafts would then have to be broken up, and the skins to be carried in a collapsed state to Jilalabad for a fresh journey. During the floods, the distance between Peshawur and Jilalabad may be traversed in 12 hours, the distance by land being about 100 miles.

The Koonur River deserves considerable notice from being similarly navigable, and from the forests which occur along the tributary which passes Olipore, and falls into the Koonur river at Chughar Serai Pareen. It presents the most feasible plan of supplying Jilalabad, and especially Peshawur, with fine timber and good fuel. The Olipore branch of the Koonur river comes, I believe, from the more western parts of Kafirsthan; it is a large torrent, and is crossed by wooden bridges, on the same principle, but of much worse construction than those of Bootan, or by beams thrown across.

At Chughar Serai Pareen, where it is rather more gentle in its course, it is fordable with some difficulty in the cold weather. The main branch, which drains the little Chughar valley, is perhaps the larger of the two; united they form a stream which I think exceeds rather in size the Cabul river at Jilalabad. Both these rivers practicable for descent, may possibly come into considerable play, should any great stimulus be given to the wool trade of Afghanistan; the low tracts along both being frequented in the cold months by the flocks of the Nomadic tribes.

The waters of the Arghandab and Logur, are chiefly used for irrigation; by the latter small poplar timbers are floated during the floods for the Cabul consumption. The Arghandab passes within three or four miles of Candahar, and though fordable, is a stream of some size. The Logur passes within a short distance of Cabul; it is scarcely as large as the Arghandab. It is in the direction of these streams which may be descended during the floods by rafts, that search for coal or any other valuable mineral product should be encouraged. Timber is, I fear, scarcely to be expected. Both these cities would double their importance, should coal mines be found within the range of either of the above rivers.

The only lake in the kingdom of His Majesty Shah Shoojah known  
Lakes. to me, is that of Cabul, which is of some extent. I am not aware of its being of any other use than supplying the market of Cabul with water-fowl, and ice during the winter, and affording in the same season healthy recreation to Affghans and Europeans.

Of Hurmal, or chalybeate springs, I observed only two; of these the  
Springs. most striking one is a chalybeate on the Siah Sing torrent, in the direction of Bamean; it is perfectly clear, and emits copious bubbles, depositing copious sediment of red powder, by which all the turf and plants around are covered. The Hurmal springs, if they can be called so, occurred at Gurmah; of three examined by Dr. Henderson of the Sappers and Miners, the hottest had a temperature of 81° and 82°. Small salt springs do not appear to be uncommon in the valley of Bamean, but are not, I believe, put to any use by the natives.

Having thus attempted a sketch of the physical features of the country, I pass to another great natural feature, the absence of forests.

It is only eastern Affghanistan that possesses forests. From Dadur to Tanjeen, three marches from Cabul towards Jilalabad, nothing wild, worthy of being considered a tree, was to be seen by the Army. An involuntary exclamation of surprise escaped me, on reaching the crest of the Huft Kotul pass, from which the fir-clad ridges above Tanjeen are visible.

The Bolan pass, beyond a few miserable Rairoo trees\* may be said to be absolutely devoid of arboreous vegetation; some pollard-looking Sehnee trees exist in the ravines of the Khojuck range, elsewhere not only are these absolutely wanting, but there is nothing like luxuriant shrubby vegetation. The forests of eastern Affghanistan are limited to the Sufaid Koh and to the Sub-Himalayas north of Pusheet and around Olipore, lat. 34° 54' 38," long. 70° 12'. On both of these mountain chains, firs, Zaitoon, and oak forests are common. Other forest trees occur on the Kafir mountains within a few miles of Olipore; of these the two most striking are the horse chesnut, and a beautiful abies or spruce fir, apparently allied to the Morinda or Khutrow of the Himalayas. These are only known to me from specimens purchased from the Kafirs.

\* Acacia?

The transition from the absolute barrenness of the Hindoo Koosh to the finely clothed Himalayas, certainly takes place somewhere to the north of Pusheet, or between it and Jugdalluck. It would appear to be almost sudden, both firs and the Zaitoon ceasing abruptly; the Baloot only straggling as far as Jugdalluck, about which it is a stunted tree, very much like a holly. During my stay at Olipore, I was of course anxious to ascertain to what causes the general barrenness of the Affghan mountains was to be attributed. Independently of consideration of climate, a primary cause appears to me to exist in the want of soil. Tillable soil exists on the mountains around Olipore, which are consequently inhabited, and partly cleared. That soil is rich, and of considerable depth, the bare rock being only exposed where the inclination of the strata approaches so near the perpendicular, that no lodgment of soil can take place.

The bare mountains, however, present very different circumstances; they are almost entirely, or quite, devoid of soil, rocks project in every direction, the intervening spaces being strewed with angular debris by no means sufficiently comminuted. These mountains are never cultivated, and sustain nothing but arid-loving thorny and aromatic species, which almost invariably occur solitarily.

The Sufaid Koh is the range best calculated for the complete investigation of the extreme inequality in the distribution of forest, for it unites in many places the characteristic features of both series of mountains, and it is this circumstance which leads me suspect, that the bareness is in some measure independent of climate.

The matter is of some importance connected with any attempt that may be made to improve this deficiency in the dominions of His Majesty Shah Shoojah.

On the climate of Affghanistan I am not able to present any details, Climate. such being only compatible with a residence of some continuation, as in all mountainous countries a great variety of local climates will be found to exist.

The general peculiarities, as compared with North-western India, are the confinement of the rainy season to the winter and early spring months, and the great dryness of the remainder of the year.

The peculiarity of the climate of the higher districts is excessive winter cold; of the lower, excessive summer heat. Even at Candahar,



which is in lat.  $31^{\circ} 35' 33''$  and at an elevation of nearly 3,500 feet above the level of the sea, the direct heat of the sun in May and June cannot be much less than  $125^{\circ}$  to  $130^{\circ}$ . Throughout the lower districts, during the hot months, westerly winds, often assuming the character of hot winds, are prevalent.

They were very incommoding at Candahar, and were rendered very hot from blowing over a desert of some extent, a short distance to the westward of that city. In certain places, these winds become quite deadly; their fatal effects have been especially experienced in Kutch Gundava, but they are dreaded by the natives in some parts of Affghanistan itself, as on the stony desert between Ali Baghan and Chardeh, near the valley of Jilalabad. In such they are I believe, known by the name of Badi Simoom.

Little or no dew is deposited in Affghanistan except in the spring  
Dews. months, and in those places, such as the Chummuns, where the water is very near the surface, and along the immediate vicinity of the lines of drainage.

I have seen it mentioned in books of some authority, that dews are the providential means by which plants are supplied with moisture in arid countries. To this opinion I do not subscribe; it certainly does not apply to Affghanistan, as I had opportunities of observing during the marches of the Engineer department. If the deposit of dew depends on the presence of moisture in the atmosphere, I do not see how it can be a phenomenon of general occurrence in Affghanistan, in which, except at the season and in the places alluded to, the air is always remarkably dry. The other circumstances known to attend on its deposit, are all favourable throughout the country, particularly the nightly lowering of the temperature, and cloudless skies. I conceive it to be probable, that in the places alluded to, as presenting deposits of dew, these may be the effects of moisture derived from the soil during the day, more especially towards its close. This moisture would be deposited during calm nights, presenting the other required conditions. But throughout the greater part of Affghanistan, the habitual summer dryness is not modified by any such source of moisture.



*Description of another new species of Pika, (LAGOMYS) from the Himalaya. By EDWARD BLYTH, Curator of the Asiatic Society.*

The genus of the Pikas, (*Lagomys*, Cuvier,) which, until the comparatively recent discovery of a species upon the Rocky Mountains of North America, by Dr. Richardson, was known only by the figures and elaborate descriptions supplied by Pallas of three species, inhabiting the Steppes of Northern Asia, has lately been detected upon the Himalaya range by Dr. Royle, who carried home a single imperfect skin of a decidedly new species from the Choor Mountain, (subsequently to which, however, other and perfect skins have been obtained,) while another new species is now figured and described, (Plate —) by Mr. Hodgson from Nepal, to which I have the pleasure of adding a seventh, recognised by Captain Broome, as of common occurrence in Lahoul, Ladakh, and Kooloo, and which extending westward, may possibly also be the "small species of *Lagomys*," noticed by Captain Thomas Hutton, as an inhabitant of the hills of Afghanistan.\*

The materials for description consist of a skull and perfect skin, (now mounted,) which were presented to the Asiatic Society, by their late Honorary Curator, Dr. Evans. The animal is in all respects a typical *Lagomys*, which precludes the necessity of entering into such details, as are of generic rather than specific application. From Dr. Royle's species, (*L. Roylei*, Ogilby,) and that now described by Mr. Hodgson, by the appellation *Nipalensis*, the present animal is at once distinguished by its inferior size, measuring but 6 inches in length, though the condition of the skull proves the specimen to have been fully grown, and its sex is male; from heel-joint to extremity of middle toe-nail measures  $1\frac{1}{4}$  inch, the ears (posteriorly)  $\frac{7}{8}$  inch and  $\frac{3}{4}$  inch broad; and the moustaches are very long, a few of these vibrissæ exceeding  $2\frac{1}{2}$  inches, and passing considerably beyond the tips of the ears. The general cast of colour, approaches that of an English Water Vole (*Hypudæus Aquaticus*), judging from memory of the latter, having a distinct rufous tinge, and the fur, which is delicately soft as in all the genus, consists, as usual, of two kinds, differing only in the longer having coarser tips of another colour, which latter is alone visible at the surface; these

\* Vide Calcutta Journal of Natural History, vol. i. p. 558.



Lagomys Nipatensis new nat size

*Rollin & co lith*



longer hairs are  $\frac{3}{4}$  inch in length, and for rather more than  $\frac{1}{2}$  inch are slaty-black, then pale brown, afterwards more rufous brown, and finally tipped with a dark colour; the under-parts are dull whitish; the feet pale brown, with a faint tinge of rufous above; the anterior moustachial bristles dull white, and the posterior portion of the same tuft blackish; and the ears are nearly naked posteriorly, having only a slight downy tuft near their base, and a scanty border of minute hairs near the margin, while anteriorly (or within) this border is more developed on the outer side, and there are some long hairs growing from the inner corner; the form of the ears is a rounded oval, with a very slight indication of a terminal angle at the extremity of the outer edge, the margin being slightly fringed with whitish; the nose is completely hairy; there is a more decided tinge of rufous on the forehead, and on the sides of the neck toward the fore-limbs; and the ear has the usual internal conch, or involucre, observable in other members of this genus. The skull measures  $1\frac{5}{8}$  inch in total length, and  $\frac{7}{8}$  inch across at the *zygoma* near the hind edge of the orbits; from front of bony palate to inferior margin of occipital foramen not quite  $\frac{7}{8}$  inch; and the vertical height, with lower jaw *in situ*,  $\frac{7}{8}$  inch. I cannot do better than apply to this species the name of *Lagomys Hodgsonii*. It is obviously distinct from all the others.

It may be remarked, that a fossil species of *Lagomys*, from the Osseous Breccia of the Island of Corsica, is noticed by Baron Cuvier, who describes and figures the skull in his "Ossements Fossiles," tom. vi., page 598, (6th edition, and plate 175,) figs. 4, 5, and 6.

1 — — — — — तेवः पान्तुजितारितामसभर — — गुणप्रेखासंख्यमयूखेशेखरनखश्रेणीधुविग्गोदयात् । प्रायैकादशभिर्गुणैर्दशशतीशक्रस्यनूनदृशां । कस्यस्याद्गुणका — —  
 2 — — — — — सगेर — — — — — भृतां ॥ ३ सद्भिरवसूरिकान्तांसाविचीचतुराननः । हरिवर्णोवभूवात्रभुविभूमुवनाधिपः । सकललोकविलोकनपंकजस्फुटनवाभुवदवालादिवाकरः । रिपुवधुवदनेन्द्रुतद्युतिः  
 3 शमदयादिविजृह्णपंडितः — — हविश्ववर्ण — — नीतोहिमकरकरैःस्फोतरत्नाकरोवापूर्वजैर्ननिजमिववभौ — — द्यारम्यंहर्मं'गुरुहिमगिरेःशृंगशृंगारहारि ॥ — — दानेनतुलिततुलिनातुलादिदानस्ययेनदेवाय — स  
 4 — — — — — तस्माद्रोमःसमजनिसम — — जनितैर्लोचनान — — धवलोवसुधाव्यापीचन्द्रादिवचन्द्रिकानिकरः । भक्ताघाटंघटाभिःप्रकटमिवमदंखेदपादेभटाना — — राजस्या  
 5 वतपतिजनता — — सुव्वराजो — — — — — वभूव ॥ श्रीमदुर्लभराजभूमुजिभुजैर्भुज्ययभंगानुतं — — पुंचन्द्रसभटेस्तस्याभिभूतंविभुः । योदवौ  
 6 — — — — — रिवपरानैषोत्परांनिर्वृति — — — — — धरणोवराहनुपतिर्दद्विपःपादपं । आयातंभुविकाण्डशीकमभिकोयत्नादरण्योदरात्तदंघ्रायाभिवरूढमूढमहिमाकोलांमहीमण्डले  
 7 — — — — — दिवाकरस्यवकरैःकठोरेःकरालिताभ्रप्रकदम्बकस्यशशिअयंतापभृद्भुतोभृतायंयमाश्रतंपादपवज्जनीघाः ॥ धनुर्धरांशरोमणेरमलधर्ममययतोजगौ  
 8 — — — — — कलमेकमेवरम्य ॥ यात्रास्यस्यरिपुदेशविसर्पिधेगाइलात्तुरंगखुरखातमहीरजांसि ॥ — — — मूर्जितमनेनविर्नाजितत्वाद्वासान्विलज्जितइवातितरांतरोभूत् ॥१५  
 9 — — — — — भिरहस्कारःकरुणयाशैडोदनिःशुद्यथानीत्यावंचनवंचितेनवचसाधर्मात्मजःप्राणेनप्रलयानिलःवल्लभिदोमन्त्रेणमन्त्रीपरोरूपेणप्रमदाप्रयेण  
 10 — — — — — परिणतवयानिःशरण्योवभूव — — अप्राहतसूरहंतंशतवाहंतंशतात्मा — — नीरहतसुहृतीनोकालुष्यंकरोतिकलिःसतां ॥ कालेकलावर्षिकलामलमेतदीयंलोकाविलोक्यकलनाति  
 11 — — — — — द्गुणैर्निधेयमितीववेधाः २० ॥ शौ — — चन्द्रचन्द्रिकारुचिरं — — — कोवान्योवर्णयत्पूर्णं । राजधानीभुवोभर्तुस्तस्यास्तेहृषितकुंिका । अलकाधनदस्येवधनाडयजनसेविता ॥ नीह्वारहारहर  
 12 — — — — — वास्तव्यभयजनचित्तसंसमन्तात्सन्तोषसम्पद — — धौतकलधौत — — रामरामाशुगद्वनयस्यां । सत्यंपरैःपापहारासदासदारजनतायां ॥२५॥ समदमदयास्तीलालापा  
 13 — — — — — तादृशसरलाःपरंमलिनितमुखायचोदृत्ताःपरंकठिनाःकुचारुचिरसरलः — — पन्थाःपरंकुठिलाःकचाः ॥ स्याद्योतुंगानिसाड्डं'सुचिकुचकलसेःकामिनीनामनोशैर्विस्तीर्णांनिप्रकामंसहृधनजघनेर्देवतामन्दिराणि । म्नाजं  
 14 — — — — — समनेत्रपात्रैपवित्रैः । सवेपात्राणिधात्रोजनसृत्तृद्यैर्विभ्वमैर्येवगात्रं । — — द्यनयानसाधिकाः । यत्रैक्षु लोकास्थोनालिकत्वाद्दिदेलिमाः । अस्यांसूरिःसुराणांगुरुवरिगुरुभिर्गौरवाद्यैर्गुणैधैःभूपालानांविचलोकीवलयविलसता  
 15 — — — — — अध्यासीनं — — विलोक्यलोकालोकावलोकंसकलसरकुलेकेवलसम्भवोति ॥ धर्मा — — स्यसंपन्नोगुणसंयुक्तः । अभ्रमागणैस्तस्यचिचनपीलवंदृशा ॥३१  
 16 — — — — — नविवेदयं — — — इतिकलंकनिराहृतयेहृती — — — तदीयवचनात्रिजंघनकलत्रपुत्रादिकं । विलोक्यसकलंचलं । यमनिकानिलादोलितं । गरिष्ठगुणगोष्ठाभःसमुद  
 17 — — — — — रामाणां मणिताराविराजितं । इदंगुणनिकाभाति — — — चतुरस्रंस्फुरद्रज — — — शुद्धशुक्तिकरोद्रक्तमुक्ता  
 18 — — — — — विहभवाभुवि पत — स — — हति — — — तां — — — यमपुरा — — — शरद्वयितयं — — — सप्रतिष्ठे.प्रतिष्ठित३२ । विदग्धनृपतिःपुरायदुतुला  
 19  
 20 — — — — — मपोपलत् । वलीधवलभूपतिर्जनपुत्रैःसमंसखे — — पिप्यलोप — — — — — । यावत्केषिशिरस्थमेकरजतस्तम्भस्थितामुल्लसत्पातालातुलमण्डपामलतुलामालम्बतेभूतलं । तावत्  
 21 — — — — — स्याद्यशेषान्ललितविलसत्तद्वितांशवातता — — — प्रभृतिरविरतिर्धुर्धर्ममाधुर्ध्ववर्धैःयत्राचार्यैर्कैरचिरमणीता  
 22 — — — — — संवत् १०५३ माघशुद्ध २७ रविदिनेपुष्यनक्षत्रे — — — प्रतिष्ठाहतामहीध्वजयामेपतृणोन्मूलोनाय

28  
 29  
 30  
 31  
 32

ननीतपूर्वं विदग्धराजेन  
 पुरजनेनच

वज्रभिर्वसुधाभुक्ताराजभिःसगरादिभिः । यस्यस्ययदाभूमिरतस्यतस्यतदाफलं ।  
 गुरोर्विग्धराजन्द्रत्तमिदं ॥ नवउशतपुगतेपुचिसप्ततिसमधिकेषुविक्रमादिन्यस्यलुण्णैकादश्यामिहसमर्पितंसमदृनृपण ॥ याव  
 श्रीमतकेशवस्वरिस तति सम्पादितं



*Literal Translation of the Dhavala Inscription. By Pundit*

• SURODAHA PRASADH.

1. May the (rays of the sun) which remove darkness, protect you.
2. The four-headed (or *Brahma* was) enamoured of *Sabitre*, the wife of *Surya*, (Sun,) from whom was born *Harivarna*, who was the ruler of the whole world. He was, as it were, the rising sun amidst the new clouds to the lily-like eyes of all, and who further deprived the females of his enemies of the beauty of their moon-like faces, (*i. e.* by causing the death of their husbands.)
3. And who has grown wise by his (constant) exercise and compassion. *Viswavarna*, was in morals like the sea rising high by the influence of the moon-beams, and glorious as having possessed the loft and ancient Jaina temple, which deprived the peaks of Himalaya of their splendour. By him (was \*\*\*) by means of gifts ——— was well as to the Gods ———
4. ——— From him was born *Aroma*. ——— From him sprung *Dhavala*, like the moon-beams from the moon, enlightening the whole world. He, while on his elephant, (in battle,) cut off his enemy's army, and thus noted his revenge.
5. A multitude of Rajas of the wild countries ——— *Soobha Raja* was born. He continually and wonderfully enjoyed (?) by the might of his arms. ——— He restored the army of (?) (to battle) who were defeated by those of *Anuchandra*. He (*Dhavala*) established two (images) of Gods.
6. ——— (He who was) superior to all, established tranquillity among his people. ——— The Raja *Dhoronivaraha*, who was himself very wise and great, threw head-long (expelled) the Raja *Kondesika* from his dominions in the jungles, as an elephant throws a tree, and a boar a young *koal*, (a kind of boar.)
7. As\* one takes his rest under a tree when fatigued with the burning sun, so the multitude have taken their refuge under him (or under the cool shade of his arms.) He was beautifully mild as the moon. Sung (the fame) of (him,) who was as the crest jewel of all the archers, and always devoted to his spotless (true) faith. He was the follower of ———

\* One whole sloka, measuring 13 letters in each stanza.

8. At his (Raja's?) expedition towards his enemy's dominions, the Sun obscured with dust (rising high) from the earth, while passed over by his army, was as it were, obliterated in disgrace, from the firmament, being totally overpowered by the spirit (of this Raja.)

9. ——— (He was?) like the sun तेजोभिः in spirit; *Boudha* in compassion; *Yudhisthira* in wisdom, truth, and virtue; *Pralayanila*\* in might; the minister of *Indra*; (*Vrihaspati*) in counsels; and (*Cupid*)† in beauty, which is attractive of female minds.

10. ——— (He) who was fortunate and virtuous, safely performed the ceremony agreeably to the doctrines (of *Veda*,) which had ever been performed by the Gods themselves and——— for *Kali*, never creates any interruption in such affairs, when undertaken by a man of virtue (as this.) (Besides) men having even in *Kaliyuga* perceived the spotless —— this Raja.

11. The Creator having as if considered it (?) proper to be placed together with talent, *palace* —— beautiful as the moon-beams. Who else could describe it in its full length? The kingdom of this Raja was *Hastikanchika*, which like the region of *Kuvera*, was inhabited by people of great fortune, and white like the ice (pearl) necklace, and like *Siva*.

12. —— Equal‡ to the minds of those, who reside (together) at one and the same place —— joy and health around —— beautiful as washed gold, where (in the kingdom) not like the beautiful shafts of *Rama* —— by others always amidst a crowd of both sexes —— moderation, restriction (of passions) compassion, and pleasant converse.

13. (Slokas of double meanings, altogether untranslatable into English.)

14. His court Pundit, who was like the priest of the Gods (*Vrihaspati*) endowed with gravity and such other *natural* qualities——

15. The splendour of a tank, (beautiful with the plants of full blown lotus) ——

16. —— The whole heavenly region was struck with wonder, admitting it to be as if the second *Lokaloka* mountain.

\* Wind at the time of Deluge.

† This comes out from sense.

‡ It is translated literally, but what the sense should be, is out of my ability to make out.

17. Having by his (?) instigation considered his wealth, wife, and sons, (family) unstable as the breeze of the fan.

18. (This temple) was illuminated (with the lustre) of the starry ornaments of female images, and exhibiting how far the power of architecture extend ——— having four corners shining with jewels, reddish like shells and pearls.

19. In this ocean of the world, established by those who are renowned. Formerly the *Vidagdha*\* *Raja* यदुत्तुला was like the descendants of *Yodu* (*Vansa*) \* \* \*.

20. ——— The powerful *Dhavala Raja* (having fought) in battle with Jains ——— so long as the earth supported on the hood of *Ananta* will continue to wear the splendour of *Pattala*, † which resembles a temple supported by a silver pillar (so long shall this \* \* \*.)

21. ——— The poet has written these slokas in best metaphors, &c. The priests who were superior in talents, moderation, and धृष्ट्य capacity, for holding burdens, performed many sacred rites.

22. ——— (He *Dhavala*) has with a view of discharging his debt to his ancestors, consecrated (dedicated) this (temple?) at Mahidhwaja (a village) in the Samvat year 1053, on the 27th Magh, while the Moon was in *Pushya*, (a planet.)

(Five lines obliterated.)

28. (This line is entirely obliterated, except the following words, “not formerly possessed by *Bidagdha*.”)

29. (Ditto, except the words “even by the people of the town.”)

30. ——— The earth has been enjoyed by many kings as the *Sagara* and others, and he who rules it in his turn, is the sole enjoyer of its fruits.

\* The word *Vidagdha*, which means “learned,” may also be applied as a name.  
—S. P.

† A watery region below the earth.

*Observations on a second Inscription taken in fac-simile from the neighbourhood of Mount Aboo. By Capt. BURT, Bengal Establishment, F. R. S.*

In a notice of the Bussuntghur Inscription, (Asiatic Society's Journal, No. 116,) I made mention of another also sent to me from the same part of the country by Capt. Burt, which I hoped might, when decyphered, throw light on the dynasty of Rajpoot chieftains, whose names were therein first made known to us. Some trouble has been required to read this second inscription, which is to a great extent not to be made out, owing to obliteration of the characters. It is cut, Capt. Burt tells me, "in the interior of a gateway leading to Mandir, distant one kos from Beejapoor, on the route from Odeypore to Sirohee near Mount Aboo."

The date of this inscription is Samvat 1053, equivalent to A. D. 996, and it is consequently 46 years anterior to that taken from the Baolee, at Bussuntgurh. It contains, also, as will be seen, notices of a new dynasty, and mentions a principality hitherto unknown. *Raja Dhavala*, of the race of *Viswawarna*, is represented as engaged in constant wars with neighbouring chiefs, and appears, on the consolidation of his power, to have followed the usual course of erecting, and dedicating a temple with pious reference to his ancestors. Lands and endowments were doubtless assigned in the ordinary mode for the maintenance of this shrine, the record of which has been obliterated with the erasure of great part of the inscription.

The facts which may be deduced from this ancient record, confirm the theory which I ventured, with Lieut. Cunningham's concurrence, to put forth, based on the Bussuntghur inscription, as respects the condition of Meywar subsequently to the first invasion of the country from Cabul, in A. D. 812. The presence in that inscription of the names of a new dynasty reigning over the country still called locally *Badari*, near Mount Aboo, about A. D. 1042, and the historical knowledge which we have of a so-called division by *Bhritripad*, about two hundred years previously of the territory under his domination among thirteen sons, led to the conclusion, that this list of names recorded the reign of a line of petty potentates, either descendants of *Britripad's* successors, or, as is more likely, of chieftains established in a small

principality by force of arms, after the temporary disruption of the monarchy at Chitore by the Mussulman invaders. The justice of this opinion is confirmed by the tenor of the *Dhavala* inscription now before us. Enough of it remains to give us evidence of the existence contemporaneously within the boundary of the ancient monarchies of Chitore and Odeypore of another petty state, whose princes we now, only have for the first time heard of in this obscure record of their acts, and whose territory may be perhaps yet, faintly remembered by some local appellation, or traditional record. The inference is natural, that similar mementos of other petty states established by the sword about the same period, during the time of political confusion may be still extant in Meywar. Their discovery would of course afford further proof of the truth of our suppositions as to the state of great part of Rajpootana, for two hundred years or more after the first Mussulman invasion.

Enquiry into such monuments of antiquity, however slow, and however desultory, has yet the advantage of adding something to the amount of our knowledge of the true history of India. Materials are gradually accumulating, whence in the course of time, a sound and rational account may be framed of men and things as they at various times have been in this vast country. From the inscription before us, meagre and mutilated as it is, we are able to find evidence of hostilities carried on at this period against the Jains, on the ground of religion, and noted in this record as an act of special merit. We are empowered to conclude, that in Rajpootana, war and foreign invasion had not as in other parts of India, (as evidenced by other inscriptions,) caused the pursuits of literature to be neglected, the style and language of the record being singularly good: the arts, as it appears by the description of the temple, continued also to flourish, and the power of the ruling prince was sufficiently well established to enable him to declare the doctrine of possession in right of sovereignty of the produce of the earth: "He who rules it in his turn, is the sole enjoyer of its fruits." The amount of information thus acquired is often but small, and the labour of attaining is heavy; but of such, let it be remembered, is the material of real history composed, and by such evidence alone are the errors and misrepresentations of tradition exposed and corrected.



*A letter to the Secretary to the Asiatic Society, on the Nurma Cotton of Bundelcund, from J. G. BRUCE, ESQ.*

In compliance with a letter from the Secretary to the Government, North-Western Provinces, regarding the Nurma cotton produced in Malwa, and requesting I would furnish you direct with any information which I might possess on the subject, I have the pleasure to inform you, that the Nurma cotton, of which the fine Chundellee cloths are manufactured, is the produce of a shrubby perennial, cultivated in the vicinity of Chunderee, to the extent required for the fabrics of that place. I never heard of any being grown for exportation in its raw state.

The piece goods manufactured at Chunderee, I beg leave to inform you, consist principally of costly cambrics, turbands, and *seylahs*, or waist bands: these were of so beautifully fine a texture, that some of the higher numbers sold for two hundred rupees a piece, and were used by the Native princes and noblemen.

Although the Chundellees are so much dearer than the Europe cambrics, the Native princes give the former the preference. It is said to be more durable, and keeps the body cooler in the hot season, from the quality it is said to possess, of more readily imbibing respiration. Had it not been for this preference, the manufacture of the Chundellees would long since have been discontinued.

When I came to Calpee in 1808, I found some few plants of the Nurma cotton in the "Nuzzer Baug" garden, belonging to the Jallone Rajah. They had been sown before the seat of his government had been removed from Calpee in 1804 or 1805, to supply him, and his household, with the Brahminical\* thread worn by the Brahmins (the Rajah himself was one) and higher castes of Marhattas. The cotton which these plants bore was beautifully soft, and of a good staple. I cannot, at this distance of time, distinctly recollect whether it was the smooth black, or downy grey seeded; but, as far as my memory

\* The Nurma cotton was, no doubt, chosen for its length, strength, and fineness of fibre. Moor, in his Hindu Pantheon, page 379, says, "The Zennar is composed of three threads, each measuring ninety-six hands (cubits); they are twisted together, and folded into three; then twisted again, making it to consist of nine threads: these are again folded into three, without twisting, and each end fastened with a knot. Of these Zennars, a Brahmin wears four; the other privileged tribes three."

serves me, I think it was the latter. It appears to have been cultivated about Chunderee, rather extensively, some years back, to meet the demand there was then for the Chundellees at all the Native Courts.

It was customary with the Native princes, when they met together to celebrate marriages, or on other occasions of rejoicing, to present to each other, as well as their dependents, the Chundellee Mamoodies, (cambrics,) turbands, and seylahs, among other things, as Khillats. In fact, these were in requisition at the Courts of all the Native princes in Bundelcund, Malwa, and Central India generally; but since machinery has tended to lower so considerably the prices of Europe cambrics, the Chundellees are merely required for the personal garments of the princes.

Chunderee is a province of the Gwalior state, situated on the banks of the Betwa river, between Jhansee and Chutterpore. I imagine the Resident of Gwalior, instead of Indore, could more readily afford the particulars required respecting the Nurma cotton. In the letter from the Secretary to the Government of Bengal, it is denominated the Nurma cotton of Malwa. Without a more definite description, the Resident may suppose that the information called for, relates to the indigenous Malwa cotton, or *Gossypium Herbaceum*, which is the same as the common Bandah. It would prevent mistake, if the Nurma grown about Chunderee, from which the Chundellees are manufactured, was mentioned.

As Chunderee borders close upon Bundelcund, I think the Nurma cotton, which has already been acclimated to the country, and used for ages in the manufacture of the finest fabrics, may be grown successfully in the whole of Central India and Bundelcund, if not generally in the North-Western Provinces. The soils of the two first are similar; principally the rich black marl: that of the latter mostly clay and sand. The black marl seems to be decidedly the best for cotton.

There is another description of cotton, which is of a longer staple, and finer fibre, than the common country. It is grown about Omrawuttee, and known in the Mirzapore and Moorshedabad marts as the cotton of that place. It has, however, the disadvantage of being very greatly intermixed with leaves and dirt, from being allowed to fall on the ground, before it is collected. In consequence of its being found so foul, there was never any demand for it in Calcutta, but it was

dispatched overland from Moorshedabad, principally to Dacca and the adjacent districts, for the manufacture of the muslins. Notwithstanding it was so foul, it realized a better price, when I was concerned in the cotton trade, than the Banda produce.

Omrawuttee is a large trading mart, situated on the Poorna river, in the Nizam's country, bordering on Nagpore. Owing to the immense distance Omrawuttee was by land from Calpee, this cotton never formed part of the Company's investment. I was given to understand it was black-seeded, and originally of foreign importation.

I have tried, at various times, the Sea-Island and Upland American, the Egyptian, the Bourbon, and the Pernambuco cottons several years, on my own account, to the extent of fifteen and twenty beegahs at a time; and lastly, on a scale of four hundred beegahs, in partnership with two of the Calcutta mercantile houses in 1837, in the neighbourhood of Calpee, with, and without irrigation; but never at a remunerating price. My last experiment of four hundred beegahs happened to be made when the famine raged with so much severity in the North-Western Provinces; and I attributed the drying up of the plants, notwithstanding they had the benefit of being irrigated during the prevalence of the hot winds, to the unfavourableness of the season. The seed was put into the ground in March and April, and watered from wells, until the periodical rains commenced; but as soon as there was a cessation of rain, the plants began to wither, and although watered afterwards, became brown, and the leaves had the appearance of being scorched, and ultimately fell off, leaving a few capsules on the leafless plants, the produce of which, unfortunately, did not cover a tithe of our outlay.

I ascribed, as I have already stated, our want of success, solely to the untowardness of the times; but from what I have observed in the present season, with respect to the experiment now carrying on under the superintendence of Captain Bayles, and the American planters, I am inclined to believe that my failure was not entirely owing to drought: for the plantations at the four localities in Bundelcund and the Dooab, bear the same appearance, as mine of 1837 did, and the result is likely to be as unfavourable.

The American planters at the Farms commenced their cultivation of the cotton with the first showers of rain that fell at the end of June, and

beginning of July last. As long as the rainy season continued, the plants looked healthy and fresh. About the middle of September, the rains, it may be said, ceased; and almost immediately after, the leaves of the plants became brownish, and began to wither and fall off. This could not have arisen from want of moisture, as some of Captain Bayles' cotton fields had only, a few days before, been well saturated with the rain that had fallen.

Towards the end of September, the wind set in rather hot from the Westward, and I am of opinion, that the injury which the cotton sustained, is ascribable to it. If my conjecture be correct, I fear the American method of culture will never answer in Upper India, owing to the hot winds.

The American mode of cotton culture, I think, is, in one essential point, objectionable with respect to this country. It exposes too much of the surface of the soil to the rays of the sun; this is liable to occasion too rapid an evaporation of moisture. It has been found by experience, the "Purwa" soil, or mixture of clay and sand, will not bear it; and the black marl, I have had opportunities of ascertaining, unless it has lain fallow for some time, and is overrun with weeds, is seldom more than superficially turned up. The "*buckhur*," instead of the plough, is usually employed in the preparation of the black soil. It has an iron scythe, in the room of a share, about twenty inches broad, and five deep, fixed to a beam of wood, between four and five feet long, and six inches in diameter. The *buckhur* is peculiar to Bundelkhand, Malwa, and Central India generally. In the course of the day, as far as five or six beegahs of land are *buckhered*. The iron scythe, which is fixed to the centre of the beam, enters about eight inches in the ground, effectually cutting, and rooting up weeds and grass, and the beam pulverizes the earth as it is turned up. The sand intended for the Khurreef, or rainy season crop, is once *buckhered* before the seed is scattered. It is then ploughed to cover the seed, and prevent the birds from getting at it. The Rubbee land is two or three times *buckhered* during the rains, and merely sown with the drill plough about eight inches deep.

The cultivators of this district have an idea, that if too much of the soil is turned up, the produce is not so great. The black soil is subject to immense cracks and fissures during the dry months of the year,



which again fill with water and close up, after the rains have set in heavily. The cotton produced in this soil has ever been reckoned superior to that which is grown in the others. It is to be regretted that the Mexican seed, which Captain Bayles brought with him to this country from America, was not tried, in the first instance, on this soil, as the rains were uncommonly mild, and in a moderate season, the cotton in this soil grows best; it would have been the means most probably, of securing an abundant supply of seed acclimated to the country, to have commenced the following year, on a scale commensurate to the magnitude of the object the Court of Directors had in view; which, I am led to believe, from having had a perusal of their despatch on this subject, is the supercession of the supply from America, for the manufactures of Great Britain.

If Great Britain is ever to look for the supply of its manufactories to India, other measures, than those which have been commenced upon, must be resorted to. Ages must pass away, (if the present method of home cultivation ever succeeds, which however is problematical,) before India can respond to the demands of England.

The most feasible and simple plan, it appears to me, would be to follow the one which Captain Bayles partially adopted this season, at my suggestion, when I was ordered by Government to aid him, in fixing his localities. I procured him engagements from the landholders and ryuts, contracting for their labour at four rupees per beegah. They were to plough,\* sow, weed, scarify, and do all the work that was required, entirely under the superintendence of the American planters. If the land-rent, establishment, and other expenses, trebled the amount, still the cost of the cotton would have been very moderate. The indigenous plant, when properly attended to, will yield at least an average produce of a maund of clean cotton; the Mexican, cultivated according to the American system, ought to give the same, if not more. Any mercantile man would pronounce a maund of American cotton landed at Calcutta, at twelve rupees, very cheap, and willingly engage for all that could be produced at such a rate through Captain Bayles' agency.

It is greatly to be lamented that the result of Captain Bayles' experiment proved so unfavorable in the present season. Had it been

\* With their own cattle.



successful, those who had contracted for their labour at four rupees a beegah, might have been encouraged to have grown the cotton on their own account and risk. Until the landed proprietors and ryuts can be persuaded to do so, there is little likelihood of India ever being able to furnish the quantity, which America now annually sends to Great Britain.

I prevailed upon Captain Bayles to receive the engagements at four rupees a beegah, with the view of shewing the Government, and the mercantile community, at what specific cost the American cotton might be produced in Bundelkhund. Unless this was done, it appeared to me, individuals would hold back, from the impossibility of telling what the actual cost of a beegah, or maund of cotton, would amount to, under the "neez," or home cultivation system. The purchase and feeding of cattle, the cost of ploughs, the pay of the ploughmen and establishment, and innumerable other expensive items, were not likely to elicit readily this desirable information.

As long as Captain Bayles and the American planters cannot make the produce of their mode of culture yield a remunerating value in the market, it is unreasonable to expect, that capitalists will embark in the speculation, or the impoverished landholders and ryuts will relinquish their system, which, they consider, secures to them at least a subsistence, if not plenty.

It is worthy of remark that the American cotton, cultivated by the ryuts with their own small-sized cattle and country ploughs, at four rupees the beegah, under the direction of the American planters, was in every respect equal to what was cultivated on account of Government, with the large-sized cattle, and American imported ploughs, under the superintendence of the planters themselves. This proves that neither a costly plough, nor team of horses, are absolutely necessary. The loss which Government must inevitably incur upon the present year's experiment, is, in some measure, repaid by the acquirement of this valuable knowledge. For how, or where, could the poor ryuts have supplied themselves with such expensive agricultural appendages, if the successful introduction of this superior description of cotton, depended entirely upon the possession of them.

It having been ascertained that the means already in possession of the ryuts, will answer for the cultivation of the American cotton, the

next point to be considered is, the most expeditious way of accomplishing this highly important national object. As the cultivators, I am of opinion, will not engage on any other terms, before they have practical proof that a beegah of the American will yield as much profit to them, as their indigenous cotton: the most eligible plan appears to be, to employ the landholders and ryuts to cultivate, as they did in the present year, by contracting at so much a beegah. If the Cotton Association, which has been established in England, will consent to undertake the risk, and come forward with the means, I am inclined to believe, that, in two or three years, a cultivation to almost any extent may be secured for the Association, through the agency of Captain Bayles, and other fit persons.

*Humeerpore, 18th October, 1841.*

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*Letter to the Editor, on Lichens in the Himalayas, from HENRY COPE, Esq.*

I regret much to say, that in consequence of my having been obliged to leave Mussooree for this place some days since, the rich harvest I had promised myself, on the investigation of the Lichens, suggested by you, has been interrupted, and I have been enabled to do much less than I had promised myself; especially as regards the investigation of the Botanical characters of the plants in question,—an almost untrodden path, and therefore the more deserving of exploration, especially with the possible results likely to accrue to the arts before me.

I have now the honour to inform you, that I dispatched, previous to my leaving Mussooree, small parcels of seven kinds of tree Lichens; which, if found useful, are likely, from the respective quantity of each, to become objects of commerce. They are two species of BORRERA or EVERNIA, one of them that is commonly in use amongst the natives as a dye, and named by Dr. Royle, *B. Ashneh*, one species of USNEA, one species of PARNULIA, three of RAMALINA, and a small quantity of a species of CLADONIA. I have been very particular in sepa-

rating all other species and extraneous matter; and as I see by Dr. Hooker, that the presence or absence of the fructification is supposed to make a difference in one of the Dye Lichens he notices, I have put in two small parcels (paper), specimens of the B. Ashneh, with and without the fructification, for separate experiments. I have sent you also, for exhibition at the Meeting of the Society, branches of the Barberry (*Rusoot*, *Berberis*) which will, in some manner, illustrate the fact of the abundance of some of the Lichens, as whole trees are as thickly covered as the pieces I send you, and absolutely killed by parasite. There are very few Lichens growing on rocks; they are almost entirely confined to the trees (especially the extreme branches, where no doubt they can imbibe moisture more freely) and shrubs, but freely taking root amongst the moss, &c., on which they may occasionally fall from the trees, detached by wind or the birds. The greater part of those I have sent, are found on almost every kind of tree or shrub; but more particularly such as have the roughest bark. The *Rhododendron* alone seems almost exempt from them, though it has other less conspicuous species lodged on its smooth epidermis.

I had commenced a collection for the Hortus Siccus, but even that was unfinished, or rather only in its infancy when I left: but such as it was, I thought it best to forward it to you, as it may enable competent botanists to pronounce more positively as to the correctness of my nomenclature, which was, however, much improved by the assistance of a small except from his Herbarium sent me by Dr. Falconer. The number of species I have forwarded is 19, and I have no hesitation in saying, that it is scarcely a tithe of those to be found in the Himalayas. The greater part however will only be valuable as botanical curiosities, as they do not individually occur in sufficient quantities, to warrant the probability of their becoming useful in commerce.

I have, in a separate communication, endeavoured to give you my gleanings of all that is known respecting the various properties of the Lichens, and would beg the particular attention of chemists, and of your Curator especially, to the recommendation of Westring respecting the extraction of the dyeing principle from the Lichen, on the spot where it is found, as the chief cost of any article sent from the Himalayas over the capital to England, would consist of freight, &c.,—

a point of great importance in so bulky a substance. Should you require larger quantities of the Lichens, I can furnish them. As the mode of dyeing adopted by the natives, may not be generally known, I do myself the pleasure of handing you the same, with a few other details, which may be of interest.

*Chulchelera* is the name by which the *EVERNIA ASHNEH* is known in the Upper Provinces of Hindoostan, but not to the natives of the mountains, who have one general name for all plants growing on the bark of trees, viz. *Chal*, a word meaning the bark itself, with all that is on it.

As far as my information goes, the chief supply of the Doab is derived from the village of Nagul, no great distance (about ten miles) from Dhera, and the town of Khalsee, on the right bank of the Jumna. In these places the dealers in Lichen of Saharanpoor, (bunyas,) have correspondents, to whom they write at the commencement of each season, and mention the quantity if most probably required for consumption. These correspondents, also bunyas, notify their wishes to the petty chiefs or zumeendars in the hills, and the quantity ordered is delivered, the Paharees receiving either cash, but mostly salt, in payment. Each Paharee brings down a load of about 30 seers, packed in leaves, and bound with Moonjh, and has to pay the Gurwal Rajah, at established chowkees, a small duty, varying according to local arrangements with the chokeydars. The time for gathering the Lichen is January and February. The Nagul and Khalsee bunyas keep no stock on hand, but send all they receive to Saharanpoor. I am told the quantity annually exported to this town barely exceeds 100 maunds, (less than four tons,) of which about ten are used in the place and its vicinity, and the remainder sent further south. When first gathered, the Paharees are not particular in confining themselves to the genuine species required, but to hasten their work, tear off several other kinds, and along with them, break off the branches on which they grow. This, and those, give much trouble to the consumer, for the exporter below does not take the trouble of cleansing the article he receives, before he sends it forward. As the Lichen is only used during the earlier months of the hot season in the plains, any remaining unconsumed after these, is spoilt by keeping in bulk during the rains, and thrown away as worthless. The entrepots for the Lichen to the east



are Kassipoor and Philibeet in Rohilkhund, which derive their supplies from the Kumaon province.

The Lichen rarely finds its way into the hands of the regular dyers, as almost every Mussulman, and many Hindoos, know how to, and do use it as a household article of manufacture, thus saving the cost of the dyer's labour. One seer will dye from ten to fifteen pieces of cloth, of the ordinary length, made in this part of the country and about two feet broad. The article when brought in the bazar, is carefully picked, and freed from all extraneous matter, thoroughly dried in the sun, and rubbed with the hand on the rope bottom of a Charpae, till not only all the remaining particles of earth, bark, &c., are rubbed through, but until the whole assumes a white colour, by the peeling off of the dark under-surface, which you will observe on the plant. This process gives to the massive an almost silky softness. The Lichen is then put into as much water as may, in the estimation of the operator, be required to dye the cloth in hand, and boiled until the colouring matter is strongly given out. The dye water is then cooled, and modified by the addition of various substances, according to the taste or fancy of the amateur dyer.

These are chiefly Kutt, (Catechu, which is plentifully produced in the Sewalik Hills by the natives, from the wood of the *ACACIA Catechu*,) a pice weight of which, to the whole quantity, deepens the colour much; but is not generally admired. The Kutt is pounded, rubbed on the *seel* with water to a paste, mixed with more water, strained, and added to the Lichen dye. This is the way in which the following ingredients are also added.

2ndly. Mehendee leaves (*LAWSONIA inermis*) much used and admired.

3rdly. Pawn leaves (*PIPER Betle*).

4thly. Flowers of the Harsinghar (*NYCTANTHUS arbor tristis*,) which is indigenous to the Dhoon (valley) of Dhera, and its neighbourhood, &c. &c.

In order to give the cloth an agreeable odour, it is usual to add, when about to be dipped for the last time into the dye, a small quantity of the following aromatics, pounded, ground, strained, and in the same manner as the Kutt, &c.; viz., Nagurmothor, (root of the *CYPERUS rotundifolius*,) Kaphoor Kucheree, (root of the *HEDYCHUM spicatum*,) and Balchur, (root of *VALERIANA Nardus*).



The cloth is dipped once, twice, thrice, or even oftener, according to the intensity of the colour it is wished to impart, carefully wrung each time, and hand-dried in the shade. The cloths chiefly dyed are those used for pugerees or doputtas. Instead of washing, (which however they will bear without loss of colour,) the cloths are, when soiled, occasionally dipped in whatever portion of the dye may have been left, and put aside for this purpose.

The Saharanpoor bazar rate of the Chulchelera will give a very fair idea of the cost and charges of not only the Chulchelera, but of all the other kinds, should they become articles of commerce, and be sought after for exportation.

The Chulchelera, in its rude state, (that is as gathered with admixtures in the Hills,) is sold in Saharanpoor, when cheap, at rupees 1-8 per maund, or 7 pies the seer, (3s. per maund, or 4l. 4s. per ton); and when at the highest price, at from 2-8 to 3 Rs. per maund, which would give from 6l. 6s. to 8l. 8s. per ton. I have no doubt that, in case of an increased demand, the article would also rise in price, and that it would never be procurable at less than 6l. 6s. per ton; that is, rupees 2-8 per maund. At Saharanpoor, it would require (or rather at Nagul or Khalsee) to be picked and properly packed,—an operation which, from its cost, say 4 ans. per cwt. and the reduction in weight it would cause (at least one-third,) would enhance the price from 2-8 to rupees 3-10-8, and including the cost of one gunny bag per maund, at least 5 ans. more, or say in round numbers rupees 4, or 8 Rs. per maund, or 11l. 4s. per ton.

To this, carriage from Saharanpoor to Ghurmuktiser, or rather Sookerthal, a ghat twenty miles above Ghurmuktiser, at the minimum rate of 8 ans. per maund, and freight to Calcutta at no less than 1-4, including insurance, &c.; and we shall find the cost of the article delivered in Calcutta to be 5 rupees 12 ans. per maund, or 16l. 2s. per ton. The freight and expenses to London will not fall much short of 5l. thus allowing the Lichen to be delivered in London at 21l. odd.

The following is a rough guess of the proportions in which the other species I have sent might be obtained, from which it would appear that there would not be much difference in the cost of the several kinds.

Taking the *Chulchelera* as the criterion represented by the figure 1, I think the other species might be thus placed:—

Everniæ species (? <i>tenacissima</i> )	...	..	..	$\frac{1}{4}$
Parmeliæ ditto	...	...	..	$\frac{1}{2}$
<i>Usnea florida</i>	...	...	...	$\frac{2}{3}$
Ramalinæ species (tree)	...	...	...	$\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{2}$

The species of *Cladonia* at not more than  $\frac{1}{8}$ , if so much.

This proportion of Course would only influence the original cost of gathering.

*Dehlee, 4th October, 1841.*

### *Proceedings of the Asiatic Society.*

(Wednesday Evening, 6th October, 1841.)

Dr. J. J. HEBERLIN, Senior Member present, in the Chair.

The following gentlemen proposed at the last Meeting were ballotted for and duly elected as Members; viz:—

Honble. A. AMOS, Esq.

R. BARLOW, Esq.

C. G. MANSEL, Esq.

Ordered—That the usual communication of their election be made to the aforesaid gentlemen, and that they be furnished with the rules of the Society for their guidance.

### *Library and Museum.*

*Books received for the Library of the Asiatic Society at the Meeting of 6th October, 1841.*

Royle on the Productive Resources of India, London, 1840, two copies, royal 8vo. 2 vols.

Report of the British Association for the advancement of Science for 1840, 8vo. 1 vol.

Proceedings of the Zoological Society of London, 1839, part 4th, 1 vol.

Hodgson's Illustrations of the Literature and Religion of the Buddhists, Serampore, 1841, ten copies, 10 vols.

The Oriental Christian Spectator, August 1841, vol. 2d, No. 8, second series, Bombay, pamph.

Transactions of the Zoological Society of London, 1840, vol. 2d, part 4th, 4to. 1 vol.

Transactions of the Royal Society of Edinburgh, 1840, vol. 14th, part 2d, 4to. 1 vol.

The Annals and Magazine of Natural History, including Zoology, Botany, and Geology, June 1841, vol. 7, No. 44, pamph.

Philosophical Magazine and Journal of Science, 3d series, vol. 18, No. 117 and 118, April and May, 1841, pamph.

Calcutta Christian Observer, October 1841, new series, vol. 2d, No. 22.

Yarrell's History of British Birds, London, 1841, part 25, pamph.

- Journal of the Bombay Branch Royal Asiatic Society, July 1841, No. 1, pamph.  
 Calcutta Monthly Journal, &c. August 1841, third series, No. 81, ditto  
 Proceedings of the Royal Society of Edinburgh, 1840-1841, No. 18, ditto.  
 Reports of the Council and Auditors of the Zoological Society of London, April,  
 1840 and April 1841, ditto.  
 Seear-Ool-Mutakh-Reen, (Persian,) 1. vol.  
 Another Persian Book, "Heedayah," vol. 3d.  
*Books presented to the Library of the Asiatic Society by Mr. A. Csoma.*  
 Histoire général des Huns, Paris 1756, tome 1ere. parties 1ere. et 2d, et tome 2d.  
 4to. 3 vols.  
 Dufresne Choix de Littérature, Edinburgh, 1808, 8vo. 1 vol.  
 Recueil ou Melange Littérature, &c. par A. Scott, Glasgow, 1803, 8vo. 1 vol.  
 Deodati Lettre d'una Peruviana, Londra, 1798, 8vo. 1 vol.  
 Journal of the Royal Asiatic Society of Great Britain and Ireland, London, 1834-  
 35-36, Nos. 2, 3, and 5, 3 vols.  
 Memoir of the Expedition of an Ecclesiastical Establishment, by the Rev. C. Buch-  
 anan, London, 1805, 4to. 1 vol.  
 Transactions of the Royal Asiatic Society of Great Britain and Ireland, London,  
 1833-34, vol. 3d, parts 1st, 2d, and 3d, 4to. 3 vols.  
 Ditto ditto, Appendix, 1 vol.  
 The Religion of Reason and of the Heart, by Chas. Benhurini, 1 vol.  
 Europe and America, or the Future Prospects of the Civilized World, by De S.  
 Phiselduk.  
 Râdjatarangini, ou Histoire des Rois du Kachmîr, traduite par M. A. Taylor, Paris,  
 1810, in 2 vols. 8vo. thirteen copies, 26 vols.  
 Comptes Rendus Hebdomedaires des Séances de L'Académie des Sciences, tomes  
 6e. à 10, 4to. 5 vols.  
 Histoire des Mongols de la Perse, traduite en Français par M. Quatremère, Paris,  
 1836, tome 1erc. royal folio, (2 copies,) 2 vols.  
 Journal Asiatique, 3rd série, Paris, 1840, tomes 9 and 10, 8vo. 2 vols.  
 Recherches sur L'Ancienne Astronomie Chinoise, 4to. 1 vol.  
 Brosset's Chronique Géorgienne, Paris, 1831, six copies, 8vo. 6 vols.  
 Nouvelle Suites a Buffon, Cours de Geologie, tome 2, et Planches, 2d Livraison,  
 Paris, 1839, 8vo. 1 vol.  
 ————— Histoire des Végétaux Phanérogames, tomes 7 and 8,  
 Paris, 1839, 8vo. et Planches, 11 à 14 Liv. 2 vols.  
 Dr. Walker's Histoire des Reptiles, tome 5, Paris, 1839, 8vo. 1 vol.  
 Ditto ditto, Planches, 5 Liv. 1 vol.  
 ————— Histoire des Insectes Orthoptères, Paris, 1839, 8vo. 1 vol.  
 Ditto ditto, Planches, 1 vol.  
 Geographie D'Aboulféda, Texte Arabe, Paris, 1840, 4to. 2d Livraison, (6 copies,) 6 vols.  
 Y.—King, Antiquissimus Sinarum, &c. 8vo. 2 vols.  
 Dupin's Bien-Etre et Concorde des classes du Peuple Francais, Paris, 1840, 12e.  
 (two copies,) 2 vols.  
 Bulletin de la Société pour l'instruction Elementaire, Juin-Sept. 1840, Paris,  
 1 vol.

- Société pour l'instruction Elementaire 24me Assemblée Générale, Paris, 2 vols.  
Assemblée Générale et Annuelle de la Société de la Morale Chrétienne, Paris, Mai 1840, (2 copies,)
- Procès-verbal de la Séance Générale de la Société Asiatique, du Juin 1840, (six copies.)
- Coup D'Oeil sur la situation de l'instruction primaire en France, par M. Boulay de la Meurthe, Paris, 1840.
- Ville de Paris, Rapports et conclusions de la Commission des livres et Methodes, Année seculaire, 1840-41, 4 pamph.
- Rapport sur la 3rd édition du Manuel des Ecoles Elementaires, &c. par M. Sarazin, Paris, 1840, (2 copies,) ditto.
- Journal de Médecine et de Chirurgie Pratiques, 9th Année, Paris, tome 9, 1 Cahier, Janvier 1838, ditto.
- Echo de la Litterature et des Beaux Arts, Novembre 1840, Paris, ditto.
- Epistemonomie ou Tables generales d'indications des Connaissances Humaines, Bruxelles, 1840, ditto.
- Extrait des Annales de la Societe Sericicole, 1840, Paris, 2 copies, ditto.
- Catalogue de la Librairie D'Ab. Cherbulliez et Cie, a Paris et a Geneve, ditto.
- Calcutta Christian Observer, new series, vol. 2d, No. 23, November 1841, ditto.
- List of the Geological Society of London, 1841, ditto.
- Journal des Savans, Janvier, Fevrier, et Mars, 1841, 3 vols.
- Jaubert's Geographie D'Edrisi, tome 2d, Paris, 1840, 4to. 1 vol.
- Transactions of the American Philosophical Society, new series, vol. 7th, parts 1, 2, and 3, Philadelphia, 1841, 4to. 3 vols.
- Freytag Hamasæ Carmina, textus Arabici, Bonne, 1826, 4to. 1 vol.
- Reid on the Law of Storms, with Charts, London, 1838, royal 8vo. 1 vol.
- Edinburgh New Philosophical Journal, by Professor Jameson, January to April 1841, No. 60, 1 vol.
- Farmer's Cabinet, devoted to Agriculture, Horticulture, and Rural Economy, 4th August 1839 to July 1840, Philadelphia, 8vo. 1 vol.
- Calcutta Monthly Journal, for September, 1841, 3d series, No. 82, 1 vol.
- Oriental Christian Spectator, September and October 1841, vol. 2d, Nos. 9 and 10, 2d series, 2 vols.
- Proceedings of the American Philosophical Society, vol. 1st, Nov. and Dec. 1840, No. 14, and vol. 2d, Jany. Feb. March 1841, Nos. 15, 16, 17, (2 copies each,) pamph. London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, 1841, vol. 18th, No. 119, and Supplementary Number 120, and vol. 19th, No. 121, 3 vols.
- Proverbia Arabica, edidit G. G. Freytag, Bonne ad Rhenum, 1838, 2 vols.
- Proceedings of the Geological Society of London, 1840-41, vol. 3d, part 2d, Nos. 72 to 75.
- Forbes on the Ancient Languages of Gaul, Britain, and Ireland.
- Freytag Darstellung der Arabischen verskunst mit sechs Anhaengen, Bonne 1830, 1 vol.
- Histoire Naturelle de Poissons D'eau douce de l'Europe Centrale, par Lieut. Agassiz, Planches, 1 vol.

Elliott's Carnatic Inscriptions, MSS. 2 vols.

Freytag's *Chrestomathiæ Arabica Grammatica Historia*, Bonne, 1834, vol. 2d, and 1st, chapters 7 to 14, vols.

Freytag's *Liber Arabicus seu Fructus Imperatorum et Jocatio ingeniosorum*, Bonne, 1832, 4to. 1 vol.

Dastoor-Ool-Aunwar, (Persian,) 1 vol.

Kittab Mat-Laol-Audda-en, 1 vol.

Read letter from JAS. CRICHTON, Esq. Colonial Surgeon, with a box of Insects from Western Australia.

Read letter from H. B. HINTON, Esq. Civil Surgeon, Akyab, with six Geological Specimens for the Economic Department of the Asiatic Society.

(To these, reference has been made in the Curator's Report.)

Read Memorandum on the organization of a Museum of Economic Geology for the North-Western Provinces of British India, submitted by Lieut. BAIRD SMITH, of the Engineers, agreeably to the request of the Society.

Ordered—That a copy of the Memorandum be forwarded to Government, and the original made over to the Secretary for publication in his Journal.

Read letter from Mr. H. COPE, of Mussoorie, offering his services for the collection of Lichens, for the purpose of assisting the researches set on foot by Mr. FID-DINGTON, for the extraction of colouring matter from them.

Read letter from Mr. Secretary BUSHBY, of 15th September 1841, intimating that the Resident of Indore had been written for information respecting the Nurma Cotton, and for specimens of the seeds and soils, and that a communication would be also made to the Lieutenant Governor at Agra, that reference may be made to the Sudder Board of Revenue at Allahabad, and to Mr. BRUCE of Bundelcund, who is stated to be well acquainted with the Nurma Cotton of Malwa.

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### *Report for the Month of September, by the Curator.*

#### ANIMAL KINGDOM.

“The arrival of two large and double glazed cabinets in the Museum, for the reception of the stuffed specimens of Mammalia, at the time of my taking charge of the Society's collections, has occasioned me to bestow more particular attention on this department, during the brief period that has elapsed since I assumed the duties of the Curatorship, and I have accordingly inspected and properly arranged what few specimens there as yet exist illustrative of the living Mammalia of India, and have labelled every species with its synonyms, so far as I have been successful in determining the latter.

“With the important accessions in this class with which the Museum has been enriched during the past month, the entire number of species of which we possess some portion, more or less, amounts to 147. There are eighty stuffed specimens, pertaining to 64 species; and seven other species may be considered as temporarily represented by imperfect skins; indeed, many of the former require exceedingly to be replaced



by better specimens. The number of perfect skeletons is 28, comprising several large and valuable species; besides which, we have nearly all the bones of the Malayan Tapir, and of a large species of Whale, with a few belonging to some other species: of skulls, there are examples of fifty-four species additional to the thirty represented by the entire (or nearly entire) skeleton; and the remainder of the collection consists of a few specimens of Bats, and one of the Sylhet Mole, preserved in spirits, the frontlets and horns of various Ruminants, and a few specimens of tusks and other parts, being all that we possess of their species, and comprising those of the Narwhal, Hippopotamus, Phacochœre, the molars of the Cachalot, &c.

“It will interest Zoologists in Europe to be informed that the spoils of the identical specimen of the Sumatran Orang-utan described by DR. CLARKE ABEL in the 15th Volume of the “Asiatic Researches,” and to which so gigantic a stature has been ascribed, are still preserved in our Museum, in so favourable a condition that I have even had the skin cleaned and mounted, which has enabled me to examine the specimen minutely, and to ascertain positively the fact of its possessing the same cheek-callosities as the great Bornean Orang-utan; the omission of DR. ABEL, to notice this conspicuous and unsightly feature in his elaborate description of the specimen, has induced a suspicion that the remarkable character in question would prove not to exist in the Orang-utan of Sumatra; nor was I able to satisfy myself of the presence of the callosities until the skin of the face was moistened and rendered pliable, when they became conspicuously apparent. This will account for their not having been remarked by Dr. ABEL, as that naturalist took his description from the dry skin, as I first saw it. The individual being merely adolescent, the callosities on the cheeks had not attained the frightful extent of development figured by M. TEMMINCK, in the instance of the fully mature Bornean Orang; nor had its beard grown to nearly so great a length. With regard to the size of the animal, the statement of Capt. CORNFoot, that “he was a full head taller than any man on board (his ship,) measuring seven feet in what may be called his ordinary standing posture,” (*As. Res.* xv, 493,) is an exaggeration to which I can only wonder that Dr. ABEL gave publicity; the length of the body, from shoulder to ham, could never have exceeded two feet and a half, and I suspect was even some inches less; and the animal was thus by no means of the largest size, nor probably quite full grown. I can perceive in it no external difference whatever from the great Bornean Orang, and consider them to be very decidedly the same in species; nevertheless, in the only portion of the skeleton of Dr. ABEL’s Sumatran specimen which the Society possesses, namely, the lower jaw, there is a very remarkable difference in form from the lower jaw of a male Bornean Orang of similar age, also in the Museum,—the ascending portion of the jaw being half an inch less broad, while the alveolar portion is considerably deeper, especially in front, and the chin more slanting. I shall take an opportunity of recurring to this subject on another occasion. That individual variation of form occurs, to a considerable extent, in certain details in skulls of the Orang-utan, is now, I believe, generally admitted by those who have had opportunities for observation.

“Considering how many years the valuable specimen which I have been noticing has been exposed to the destructive influences of an Indian climate, hanging from the wall of a room, it is consolatory to find that it is in no respect much injured by such exposure, while it encourages me to hope that, with proper care and attention, the

mounted skins of animals in our Museum may be preserved for an indefinite period, with little more than the same protection which such specimens receive in Europe.

“Of the next genus, that of the Gibbons (*Hylobates*), two highly interesting fresh specimens have been presented by the Right Hon’ble the Governor General, which had died in the park at Barrackpore. One of these is a half-grown female of the Hoolock, or White-browed Gibbon, (*H. Hoolock*, Harlan, *H. Scyrites*, Ogilby, and the brown variety *H. Choromandus*, Ogilby). The specimen is in beautiful condition, and if any doubt could exist of the specific identity of the *H. Scyrites* and *H. Choromandus* of Mr. Ogilby, the present individual would remove that doubt, from the intermediateness of its colouring. The other specimen is a still younger female, also in admirable *pelage*, of the White-handed Gibbon (*Simia Lar*, Linnæus, but not *H. Lar* of Vigors and Horsfield, which applies to *H. Agilis*; *H. Albimana*, Vigors and Horsfield, *S. Longimana*, Schreher, and the brown variety—*Pithecus Variegatus*, Geoffroy, but not *H. Variegatus* of Müller, which refers to *H. Agilis*.) The colour of this specimen is a very pale yellowish brown, and every intermediate shade between yellowish white and deep-black is exhibited by the species, in common with the greater number, if not all, of its congeners; the circumference of the face and the four hands being white invariably. This species of Gibbon is generally brought from Singapore, and according to the most trust-worthy information, is unknown in Sumatra, Java, or Borneo, in each of which islands it is represented by a nearly allied species, respectively peculiar to the island, viz. by *H. Agilis* in Sumatra, *H. Leuciscus* in Java, and *H. Concolor* of Müller in Borneo; whether the last-mentioned is identical with the *H. Concolor* originally described by Harlan, remains to be determined: the present specimen was brought from Moulmein; and it is doubtless the species referred to by the late Dr. Helfer in Tenasserim, as being “the most common species of its genus in the interior, howling most piteously in the solitary forests:” that gentleman also mentions the Siamang (*H. Syndactylus*), as having “been found in the southern parts of Tenasserim, up to the 15th degree of north latitude;” a statement it would be desirable to have confirmed, as this animal was previously supposed to be restricted to Sumatra. Finally, to complete this brief notice of the Gibbons, the remainder consist of the Hoolock upon the hills of Assam and Arracan, and the White-cheeked Gibbon, (*H. Leucogenys*, Ogilby), a species lately characterized from a young individual in the possession of the Zoological Society, and the habitat of which was unknown. My friend and fellow-passenger, Lieut. Beagin, however, of the 2nd Madras Cavalry, recognised the drawings which I possess of this species, as decidedly representing one which he had often seen upon the Malabar ghauts, and forests of the Neelgherries, and which varies as much in shade of colour as the others (the Siamang, perhaps, alone excepted, which has never been observed otherwise than black.) Mr. Beagin had seen and handled a freshly killed specimen of the full-grown male, which taking it under the arms required considerable exertion to lift; the height was about three feet. Speaking on this subject to Mr. Walter Elliott, that naturalist remarked to me, that he had never heard of such an animal in those parts; but Mr. Ogilby, in his treatise on the Apes, (published in the Library of Entertaining Knowledge), states, “We have heard from an officer of high rank and celebrity that there is unquestionably a real Ape in the forests of the Malabar coast: he had often heard the natives speak of it, and not unfrequently heard its cry, *wow-wow*,

in the woods, though he had never actually seen it." Of all these species of Gibbon, it is highly desirable that the Society should possess a good series, illustrative of the principal variations of colour; at present we possess but four specimens, namely the Hoolock just mounted, and a young one in bad condition; and a black specimen of the Lar, which contrasts remarkably with the almost white example that has been just set up. The kindness of Dr. Walker enables me to exhibit an equally pale specimen of the Hoolock. I have had the skulls of all four taken out, and the entire skeleton of the new Hoolock is in course of preparation. I have saved also the *cæcum* with its small *appendix vermiforme* of this specimen. It should be remarked that the individual of *H. Lar* here noticed, possessed 13 pairs of ribs, whereas Daubenton, as quoted by all subsequent writers, found but 12 pairs in the specimen dissected by him. (Vide Buffon, *Hist. Nat.* xiv. 104.)

"When at Madras, two packages of skins were entrusted to my charge, for the Society, the one a donation from Dr. Coles, and the other from David Ross, Esq. The former consisted entirely of those of Mammalia, procured in Travancore. Among them are some highly interesting specimens. Of the genus *Semnopithecus*, there are two species new to the Museum, which previously contained only a half-grown female of the Hoonuman, (*S. Entellus*.) One of these is referrible to the Hooded Semnote, (*Simia Johnii* of Fischer, *Sem. cucullatus*, Is. Geoff., and apparently also the "Leonine Monkey" of Pennant and Shaw.) The specimen is a female, nearly half-grown, but which had not begun to change its first dentition. It would seem to be this species which is indicated in the following passage, extracted from Dr. Harkness's volume on the aborigines of the Neelgherry Hills, (p. 61.) That author notices— "A number of large black Apes, which kept up a continual rustling among the trees, and every now and then projected, from below the foliage, their grey-bearded visages, chattering, and apparently surprised at our intrusion."\* I have been informed that it keeps always to the trees, and never, like the Hoonuman, resorts to houses; this I mention, because nothing has been hitherto published of the habits of the species. The other specimen, if not an entirely new species, is a finer example of the adult male *S. cephalopterus*, (*Cercopithecus latibarbatu*s, Desmarest, *C. leucoprymnos*, Otto, *Sem. fulvogriseus*, Desmoulins, *S. Nestor*, Bennett,) than appears to have been hitherto met with by naturalists. Indeed, it differs so much from all the descriptions I have seen of the latter, and from the figure supplied by Mr. Martin, that I much suspect it will prove to be new, in which case I would propose for it the appellation—*S. hypoleucos*.† This animal is nearly allied to the *Entellus*, but considerably smaller, the present apparently aged male measuring about twenty-one inches from crown to base of tail, the tail thirty-two inches, (which accords with the dimensions of *S. cephalopterus*.) The entire back and shoulders, together with the outside of the humerus and thigh, are of a rather deep and somewhat dusky brown, with a tinge of chocolate, becoming paler laterally, and having passed into white on the sides, under parts, and inside of the thigh and humerus; the face, ridge of hairs impending the brow, a few on the cheeks and lips, with the whole tail, and the remainder of the

\* Vide a notice, also, in Dr. Royle's Illustrations of the Botany, &c., of the Himalaya Mountains, at the end of a note to p. 30, where the productions of the Neelgherries are adverted to.

† Since writing this, I have seen the *S. cephalopterus* alive in the park at Barrackpore, and can therefore pronounce on its distinctness from *S. hypoleucos*.—Cur. As. Soc.

limbs, deep black, mixed with whitish inside the fore-arm and in front of the leg; crown, occiput, sides of the head, or what are called the whiskers, together with the beard, brownish white, having a faint tinge of the hue of the body upon the vertex; the whiskers are not remarkably lengthened, though very copious, and do not stand out in the remarkable manner stated, as well as figured, of those of *C. cephalopterus*. All that I could learn of this monkey was, that it bore the name of the Travancore Monkey in Madras. The *S. cephalopterus* is only known to inhabit Ceylon.

“The remainder of Dr. Coles’ donation consists of the following specimens and species:—

*Galeopithecus Temminckii*,

*Pteropus medius*,

*Taphozous brevicaudus*, Nobis, (a new species, entirely distinct from another in the Museum, which again differs from *T. longimanus* of Hardwicke, the only Indian species as yet described,)

*Sciurus maximus*, (three specimens,)

—— *hippurus*,

—— *erythræus* ?

*Pteromys petaurista*,

*Gerbillus Indicus*, and

*Meminna kanchil*, (a nearly white specimen from Malacca.)

“Of these it will be sufficient to remark, that the specimens of *Sciurus maximus*, with those previously in the Museum, illustrate the gradations of variation in colour to which this species is subject: while I may also mention that all the examples of genuine *Pteromys petaurista* which I have seen, whereof the habitat was known with certainty, were brought from Travancore;\* though it is doubtless the same species of which Major Forbes gives so interesting an account in his ‘Journal of Eleven Years Residence in Ceylon:’ the allied *Pt. nitidus* comes always from the Malay Peninsula and Islands, and the *Pt. magnificus* from the Himalaya. The *Galeopithecus Temminckii* is entirely distinct from the species inhabiting the Phillipines, as lately shewn by Mr. Waterhouse.

Mr. Ross’s donation consists almost entirely of Birds, but contains three skins of Mammalia, and one Reptile; viz:—

*Pteropus medius* ? (most probably distinct, but I wait for further data before deciding,)

*Megaderma tyra*,

*Herpestes griseus*; and the Reptile,

*Varanus binotatus* (*Lacerta binotata*, Kuhl.)

The following are the Birds:—

*Upupa Epops*,

*Alcedo Bengalensis*,

*Halcyon Smyrnenis*,

*Merops Phillipinensis*, (adult and young,)

*Coracias Indica*,

\* The Society has since received this species from Moulmein: and the *Pt. Ora* of Lt. Tickell, (described in the *Calcutta Journal of Natural History*, No. 7, p. 401.) would seem to be no other.—Cur. As. Soc.



*Bucco Indicus,*

*Eudynamys orientalis,* (male and female, remarkable for the great sexual diversity of plumage,)

*Centropus pyrrhopterus,*

*Lanius Hardwickii,*

*Lanius minor?*

*Copsychus saularis,* (Wagler,)

*Hæmatornis,* (Swainson,) a species nearly allied to *H. Caffer*, but much smaller, having the upper parts, with the hind-neck and breast, of a hair-brown colour, slightly fringed (as in *H. Caffer*) with greyish, and the under-parts dull-white, mixed with brown anteriorly; in other respects a miniature of *H. Caffer*: entire length 6½ inches; of wing 3¼ inches; tail 2¾ inches; tarse ¾ inch, and bill from forehead ½ inch. Should it be undescribed, I propose for it the appellation *H. pusillus*.

*Pitta brachyura,*

*Oriolus aureus,*

*Euplectes Phillipensis,*

*Pyrgita Domestica,*

*Cinnyris Mahrattensis,* (two specimens,)

———— *sola,*

*Perdix Argoondah,* (male and female,) *Coturnix Argoondah,* Sykes,

*Hemipodius pugnax,*

*Glareola torquata,*

*Tachydromus Asiaticus,*

*Parra Sinensis,* (adult and young,)

*Himantopus melanopterus.\**

“I have also to acknowledge the donations of a fresh-killed specimen of *Pteropus medius* from Mr. J. J. Maclean; of a fine Alexandrine Parroquet, (*Palæornis Alexandri*,) from Mr. L. Swarries; of a Bat, (*Scotophilus castaneus*,) from Mr. Bouchez; and two young Bats, of a species nearly allied to the European *Pipistrelle*, have been picked up in the compound surrounding the Museum.

A large box of Insects, collected in the Australian settlement of Swan River, has also been presented to the Society by Mr. Crichton of that place, containing many interesting specimens, and especially valuable for the number of duplicates comprised, the importance of which, properly distributed, need not be further adverted to. The collection contains 287 specimens, referrible to about 80 species, and the *Coleoptera* outnumbering all the other orders. A considerable number of native insects have been taken by a person I have employed for the purpose.

“In the Osteological department, the skeleton of the Rhinoceros, which was much soiled and badly set up, has been taken to pieces, cleaned, and is now in process of being remounted. Several small skeletons are also in course of preparation, and some skulls have been added to the collection. A skin of the Yak, (*Bos grunniens*,) which,

\* The whole of these specimens were collected in the Zillah of Chingleput, as Mr. Ross has since informed me.—Cur. As. Soc.



for five years, has been hanging to the wall of one of the apartments, I have had moistened and stuffed, and the skull, which was wanting in the collection, taken out and cleaned. The mounted skin now forms a very good specimen of the stuffed animal.

MINERAL KINGDOM.

But a single donation has arrived during the past month in this department, consisting of six specimens, presented by H. B. Hinton, Esq. for the Museum of Economic Geology; viz:—

- One example of Granite Rock in the Ganges at Puturghat,
- One of Hornblende, from Sicrigully, Rahjmahel,
- Trap, called Whinstone by Buchanan, from the same locality,
- Kunkur, ditto,
- Quartz, 'fat and mealy,' ditto, and
- Iron, ditto.

"Lastly, Dr. Lloyd has sent for deposit in the Society's Museum, a Deep Sea Clam and Cylinder, of which every care will of course be taken."

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The Secretary, before reading the foregoing report of the Curator, (Mr. BLYTH,) took occasion to introduce him to the meeting, and proposed that the services of Mr. PIDDINGTON, late Curator, be suitably acknowledged.

The best thanks of the Society were accordingly accorded to Mr. PIDDINGTON, for his valuable services during the time he officiated as Curator, and hope expressed that he would continue to afford his services in the good cause which he has as much at heart as the Society, to promote.

Read a proposal from Molovi Abdoolah to reprint in Persian, the "*Hedayah*," and soliciting the patronage of the Society for the undertaking, by their subscription for 100 copies.

This proposal not coming within the province of the Society, it was proposed by Dr. HÆBERLIN, and seconded by the Secretary, that the Society subscribe for five copies, as an encouragement to the Molovi for his undertaking.

The proposal having been put to the vote, it was lost by a shew of hands: ordered, therefore that the proposal be declined, and the Molovi informed accordingly.

Read letter of 1st October 1841, from Dr. HÆBERLIN, submitting his reasons for proposing that Professor H. EWALD, of Tübingen in Wirtemberg, be elected an Honorary Member of the Asiatic Society of Bengal.

Read report from the Secretary and Officiating Curator of the Society of the 18th June last, with correspondence on the subject of the Geological Collections of Capt. HUTTON.

Ordered, that the subjects of two foregoing papers be submitted to the Committee of Papers for consideration and report.

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Read the following report from the Librarian for July last:—

SIR,—I have the honour of transmitting to you my report of last month, requesting you to lay it before the Committee of Papers.

It was highly encouraging to me, that the plan which I had the pleasure of proposing for a new arrangement of the Library and Catalogue met, in its general features the approbation of the Committee.

In compliance with their request, I now beg to state what progress has been made in the new arrangement during the last month, premising, that it was commenced on the 19th ultimo, when I received a communication from you concerning the resolution of the Committee.

The classification adopted for the Classic Literature, is as follows :—

- I.  
CLASSIC LITERATURE.
- |                         |                   |
|-------------------------|-------------------|
| 1.                      | 2.                |
| Greek Literature.       | Roman Literature. |
| A. Philosophy,          |                   |
| B. History,             |                   |
| C. Geography,           |                   |
| D. Miscellaneous Works. |                   |

This division of the new catalogue has been completed, and the books of the Library referring to it, have been arranged accordingly.

The classification of the second division is also commenced, and the works, belonging to its first head, viz. Theology, have been entered into the catalogue ; the arrangement has proceeded to the heads of Jurisprudence, Medicine, and Philosophy.

The following is the classified arrangement of Theology :—

II. Literature of modern times from the commencement of the Christian æra to the present age.

- I.  
Theology.
- |   |   |                |
|---|---|----------------|
| A.  | B.  | C.             |
| Polytheism.   | Monotheism.   | Pantheism.     |
| A   | A   | B              |
| B   | C   | C              |
| Special forms of Polytheism :<br>a. Religion of Egypt.<br>b. ——— of Greece and Rome.<br>c. ——— of Zoroaster.<br>d. Brahmanian.<br>e. Buddhism.<br>f. Religion of Confucius. | Judaism.<br>Christianity.<br>a. Holy Scriptures and their parts.<br>b. Biblical Criticism and Interpretation.<br>c. History of the Christian Church.<br>d. Miscellaneous Works. | Muhammedanism. |

I beg to observe with regard to this classification, that the subdivisions have of course been made according to the number of works in the Library, as a complete arrangement cannot be made, except there be a number of books sufficient to represent the co-ordinate divisions of a branch of Literature.

I add two lists which have been prepared during last month for the consideration of the Committee, one of all the defective works in the Library, specifying the volumes which are wanting, as many of these works contain the most important information about subjects intimately connected with the purposes of the Asiatic Society, which renders it very desirable to have them completed.

The second contains the number of books which require to be rebound. With regard to them I would observe, that though the expense of putting them into good condition, may be considerable, the preservation of so many excellent works will justify the outlay; for should they be allowed to remain in their present state, most of them will soon be so far destroyed as to be of little or no service in the Library.

Should the Committee resolve to have these books rebound, I would take the liberty to suggest, that several respectable Book-binders be requested to send in their estimates. I would also remark that, when books, requiring to be bound, are many, as for instance in a Public Library, the prices ought to be something less than the common rates.

The rate for the binding of books, as fixed at present, appears too high, as the accompanying list of the respective rates apparently shews.

11th August, 1841.

I have the honour to remain, Sir,

Your obedient servant,

E. ROER.

Read report by Mr. PIDDINGTON, on the Cylinder found on the hills near Herat, and presented to the Society by Major E. POTTINGER, which the Secretary informed the Meeting he would print in an early number of his Journal.

Read letter of 1st September 1841, from Lieut. A.-CUNNINGHAM, of which the following is a copy:—

MY DEAR TORENS,

Lucknow, 1st September.

The Silver Plate of which you have got 500 lithographed copies, appears to me to represent most unquestionably the portrait of Sapor II. or Shahpuhr Zu'l Aktaf, or Zu'l Aknaf; for in the list of the Sassanian Kings, whose dresses are described in the *Majmul-ut-Towarikh*, I find that he is the only one who has a crescent on his crown. His dress is thus detailed, a rose coloured tunic; red pantaloons; a crown of blue and gold, embroidered in different colours, surrounded by two circles of gold, and ornamented with an embroidered crescent.

Do you think then that *Zu'l-Afkun*, or "Lord of the Lion," might be substituted for *Zu'l-Akta'f*, "Lord of the shoulders"; and *Zu'l-Akna'f*, "Lord of the wings?" The last of these is supported by the wings, which appear on the head-dress of so many of the Sassanian Princes?

Yours sincerely,

A. CUNNINGHAM.

For the Contributions and Presentations thanks were accorded.

## ADVERTISEMENT.

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The "Palæologica" I published in the year 1832, as well as my work on fossil bones of the country of Georgensgmünd (1834) and my palæontological treatises contained in the Transactions of Academies and various Natural Societies, were so favourably received, that since some years I have been honoured with specimens of similar fossil organic remains of a former world, which on examination, offered important matter for results about fossil bones of the Mammalia, Reptiles, and Birds. Whilst these rare treasures were imparted to me by public and private collections of Germany, Switzerland, and the adjacent countries, with a readiness deserving every encomium, I am requested from different parts, not to publish my inquiries separately, but in a particular work. In order to satisfy such unbounded confidence and kind desire, I am willing to advance a work under the above title referring to the Fauna of a primitive world, which will contain my inquiries about fossil bones. As it is impossible to give a complete insight with this advertisement, it will suffice, to form a judgment of its worth, by citing, that this work, among the rest, will treat—of fossil bones of Pachydermata (Mastodon, Rhinoceros, Palæotherium, Dinotherium, Tapir, Microtherium, &c.), Ruminantia (Palæomeryx, Orygotherium, &c.), Rodentia (Lagomys Oeningensis), Carnivora (Harpagodon, Pachyodon, &c.), Tortoises, Sauriens, Frogs, and Birds, which have been found in beds of Lignite or Brown-coal in Switzerland and in other deposits of Molasse in this country, as well as in the pits of pisiforme Iron ore or Möskirch, in the calcareous marl near Oeningen, the gypsum near Hohenhoven, in the strata near Weisenau, and in other tertiary strata ; of the skeleton parts of the marine Mammalia, called by me Halianassa, which very well designates the upper tertiary formations of our part of the world ; of remains of Sauriens, Tortoises, and Birds from the cretaceous group (in the canton of Glaris, &c.) ; of the Plateosaurus from the Keuper ; of the teeth of the Ischyrodon ; of Sauriens and Tortoises from the famous formation of the lithographic limestone of Solenhofen ; by the co-operation of the President Baron Andrian and the Count Münster, of the re-

markable Sauriens of Muschelkalk (Nothosaurus, Pistosaurus, Charitosaurus, &c.); and of the other fossil vertebrated animals.

As to the present eager pursuit of historical investigations about the constitution of the earth and the development of its organic types of animal life, there can be no better evidence than the remains of animals in the crust of the earth, amongst which the vertebrated animals are no doubt of the greatest importance. Thus if we add the creatures produced by the earth in a primitive age to the number at present only, we are able to estimate the riches of the whole creation, and to explain the alternations resulting from the sublime laws of nature. I am confident, therefore, that the publication of a work like this, containing anatomical and geological discoveries of a former world, will be readily promoted.

The work will appear in several numbers, the price of which shall be calculated, as is customary with such works, after the number of sheets in German, printed in Latin letters in gr. 4°, and according to the number of tables in fol°. with plates after my own drawings, or executed after my immediate direction. As gain is not the object of this publication, the lowest price cannot be determined before I know the number of subscribers; the number of copies will not exceed much the number required, and the price in every case, will not be higher than that of similar works. The subscribers will please to send their direction to the author by the post, or by well known libraries, but plainly written. The list of subscribers will be joined to the work.

HERMAN VON MEYER.

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